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Illuminated Dimensions: Providing an Intellectual or Spiritual Enlightenment through Existence

Michelle Renee Barton

University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by Michelle Renee Barton entitled "Illuminated Dimensions: Providing an Intellectual or Spiritual Enlightenment through Existence." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Architecture, with a major in Architecture.

Katherine Ambroziak, Major Professor

We have read this thesis and recommend its acceptance:

Barbara Klinkhammer, Scott Wall

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

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Illuminated Dimensions: Providing an Intellectual or Spiritual Enlightenment through Existence

A Thesis Presented for
The Master of Architecture Degree
The University of Tennessee, Knoxville

Michelle Renee Barton
May 2008

DEDICATION

This thesis is dedicated to my mom, who has been my constant support through all six years of architecture. Through all the ups and downs she was always extending her encouragement. She is the strongest, most independent woman I know, and I am proud of all the steps she has taken to be where she is at today. She is my mother, my friend, my inspiration.

ACKNOWLEDGEMENTS

I would like to thank my fiancé, Jake Thomas, for being a steady support throughout my graduate studies, understanding and encouraging me to do my best. I also want to thank my primary advisor, Katherine Ambroziak. Her support and guidance has led me through my thesis year. Her thoughtful design and intent has helped me grow exponentially within this last year of my endeavor toward my masters. Thank you to my secondary advisors, Scott Wall and Barbara Klinkhammer. Their insightful critiques have pushed the development of my thesis and thought process.

I would also like to extend my thanks to my family and friends. To my father, who has always believed in me, to my brother, who is there to give me a laugh when it is most needed, to my grandparents, who were always sending care packages full of cookies for my production mode weeks. Many thanks to my fellow students, from both undergraduate and graduate programs, with their collaboration and help, I was always able to turn to them for advice through frustrating times. And finally, to my friends, who even without an understanding of architecture, helped and encouraged me.

ABSTRACT

Individuals go through a series of emotional experiences throughout the day when interacting with architecture, which can range from the normative or everyday to a complete spiritual awareness. These experiences can be shaped by the spaces they inhabit, and furthermore, by various qualities of light, providing a heightened awareness or shift in ones perception. By understanding four conditions the architect can begin to design with light. These conditions are; understanding the people that will interact with a space, understanding the task and emotions typically associated with it, understanding how people typically perceive qualities of light, and understanding how the architect is able to manipulate light physically. The architect uses texture, solids and voids, opacities, transparencies, and translucencies to modify light as well as lights characteristics, intensity, contrast (sharp or blurred), color shifts, and temperature to shift an emotional condition.

Through an analysis of various precedent studies, using sacred, profane, and natural space, I have developed an understanding of the qualities of light that alter emotion. The programmatic choice for this thesis, a winery and vineyard, demonstrates the importance of light for both its daily and occasional users, where an outline of their activities gives an idea of the emotions they may go through. The quality of space and materiality are then defined by resolving what spaces are to be reserved for the specific articulation of light. These spaces are then designed around the four conditions that shape the light.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

Thesis Statement

This thesis is an investigation into the characteristics of light, which can be ordered through design to heighten awareness and alter perception. With attention to solids and voids, opacities, transparencies, and translucencies, the various conditions by which light may be manipulated, including its modulation through apertures and diffusion through translucent materials, the ephemeral properties of light can be altered. Studying this phenomenon in natural, sacred and profane space, comes a knowledge of light's formal, quantitative, qualitative, and symbolic meanings, which provide an understanding of how the quality of light is felt (emotionally) and not just seen. Using these qualities and implementing them within a design to obtain the desired awareness of a buildings user, an analogy of approach to design within any architecture is developed.

CHAPTER II

Introduction

"The perceptual spirit and metaphysical strength of architecture are driven by the quality of light and shadow shaped by solids and voids, by opacities, transparencies, and translucencies…What the eyes see and the senses feel in questions of architecture are formed according to conditions of light and shadow" (see figure 1 and figure 2).

Steven Holl, 63

In his book *Masters of Light,* Henry Plummer relates light to being, stating "light was used often to erode and transform objective reality, constructing a new reality of independent energy and forces whose animate powers could resonate within a living observer" (20). Light allows us to see, it gives us warmth, it provides us a means to appreciate the tactile. Within architecture light is used as a means of highlighting space, either physically or emotionally. From Gothic churches emphasis on light and shadow to modern Chapels today, a certain quality of light is associated with the euphoric space, revealing spirit and time. Through architecture light can be controlled and utilized to heighten awareness and alter perception.

By understanding light's behaviors an architect can speculate the effect on people's intuition, the recognition of a feeling, or the awareness that occurs by way of the senses. This feeling transpires through the interaction of space and its physical properties, its material, form, color etc. Light can enhance an emotional shift or change, reveal an activity or sequence, and become a relevant part within the space. Mapping out the levels of experience (the normative or everyday, the psychological forces, and the spiritual awareness) with the various emotional states of the individual, defines how the individual moves through and distinguishes the space, where the depth and weight of time is perceived.

Figure 1: St. Ignatius Chapel, by Steven Holl, Photo by Abbeville Press
http://www.abbeville.com/Products/Interior Images/0789208806Interiors.htm

Figure 2: The Swiss Residence, by Steven Holl, photo by Steven Holl
http://www.stevenholl.com/project-detail.php?type=houses&id=54&page=0

By using this method of approach, with an understanding of the sites history and potential light qualities, an architect can define space and form to heighten awareness and alter perception though its material and sculptural qualities. Light, essential to vision and interaction of space, provides a physical connection for a person to his or her surroundings.

Architectural discourse today addresses various formal, scientific, qualitative, quantitative and symbolic properties of light as well as its psychological effects. For example, formal (artificial) light addresses the means by which it interacts with space to emphasize form and guide the circulation of the building. Quantitative properties of light can be controlled or studies in regards to providing a sustainable environment and reducing the imprint of the building. Symbolically, light represents different meanings for given cultures. Various cultures believe in its healing powers, from the "ancient Greeks, who believed in both the preventative and curative powers of natural light…[to modern times where] daylight has been found to deter an increasingly large list of diseases and help entrain our biological rhythms and hormonal distribution" (Plummer, Masters of Light 50). To some, light is a metaphor of life, used to purify and cleanse the soul, as a connection to ones spirituality. Emotional connections and memories are established through all senses, through what one smells, feels, tastes, or hears within the space. The sensual and tactile experiences reinforce one another.

Steel allows for the maximum amount of glass to be used, thus light to enter the space, creating the visual interaction of its users with their surroundings.

This argument is supported by Henry Plummer who states that “our initial experience is the global apprehension of an atmosphere enveloping the building…One senses immediately an overall and instantaneous impression of [shadow and light] that can only be apprehended by the sensibility. The totality of tones, to which every part of the surface participates, forms a reality grasped at a single glance and often with emotion...[where its] effect is *felt* rather than *thought*” (Plummer, Masters of Light 70). Sacred spaces have the effect of creating this emotion, a heightened awareness, and a mental preparation. Religion associates light to the holy as a means of raising ones spirit to the heavens, signifying transcendence, and uses focused light at key moments to heighten an emotional response. Light is also often used to orchestrated ritual in religion, instilling a heightened sense of awareness, or spiritual well-being.

> “It is necessary to return to the point where the interplay of light and dark reveals forms, and in this way to bring richness back into architectural space. Yet, the richness and depth of darkness has disappeared from our consciousness, and the subtle nuances that light and darkness engender, their spatial resonance-these are almost forgotten. Today, when all is cast in homogeneous light, I am committed to pursuing the interrelationship of light and darkness. Light, whose beauty within darkness is as of jewels that one might cup in one’s hands; light that hollowing out darkness and piercing our bodies, blows life into ‘place’.”
>
> Tadao Ando (1990, 1993)

Ando’s words focus on the need to address more than the incorporation of light in architecture. It addresses a need to awaken the senses by the use of its counterpart, shadow. This study will define the way in which the precedents address the visual qualities of light and lights various degrees as it grazes surfaces, enhancing the perceptual shift of a space to create meaning. Both the site and the case studies will be evaluated according to these principles. Through the understanding of the physical and emotional connections to light

architecture may begin to support a spatial and emotional sequence.

A winery and vineyard is the programmatic choice for this thesis given the site's history and the varying degrees of emotional states that its users encounter: the vineyard worker who has the daunting task of pruning, harvesting, and maintaining the vines, the winery worker who must regulate the wines, the owner who must oversee all processes, or the visitor, who comes to escape from the hustle of the city. Light is used to inform the design such that it creates meaning and fosters a connection between inhabitants, program and site. The chosen site, the historic Knoxville Botanical Gardens, is located in East Knoxville on 44 acres and contains several existing stone walls and mature vegetation, offering incredible potential of creating a tactile experience. Today, the site is surrounded by low income housing. Therefore the social implications of providing a space for income, identity, and relief on this site will also be considered. Programmatically and psychologically the use of natural light informs the initial design factors.

With consideration of light the architectural form has the opportunity to provide someone with an intellectual or spiritual enlightenment. By thoroughly understanding the various levels of reality, consciousness, or existence (for the users) the architect can choose where the need for a heightened awareness or shift in perception would be most beneficial for its users, creating an *Illuminated Dimension*.

CHAPTER III

Light in Sacred Spaces

Already imbued with a euphoric, holistic meaning, light within sacred spaces, such as a church, is used to signify the heavens while mentally preparing its patrons for acceptance into its faith. Often at the front of the apse, light relates the priest (or equal) to his hierarchical position. Many religious structures use lights counterpart, shadow, as a means of heightening awareness within these structures. Many also use light as a calming factor, or a means to symbolically convey the heavens. Historically stained glass, specifically pictoral, was used to tell a story, but also served to diffuse harsh light and decorate space with prismatic color. Modern religious spaces are investigating varying degrees of transparency, allowing another approach in defining a story, a space, a ritual.

St. Ignatius Chapel

Steven Holl designed the Chapel of St. Ignatius around the metaphor of the seven bottles of light (Figure 3 and 4). After traveling to Montserrat and Rome to do extensive research on St. Ignatius, a sixteenth century saint, he designed the chapel around the procession and the individual moments of worship using light as a supplemental tool to help one “make authentic and just decisions” (Holl, 9). These “bottles” were used to gather light from all directions through its roofing structure where light begins to inform the rituals of the Catholic worship.

Figure 3: Panoramic facing the altar (St. Ignatius Chapel interior, Seattle) (hakee, www.flickr.com)

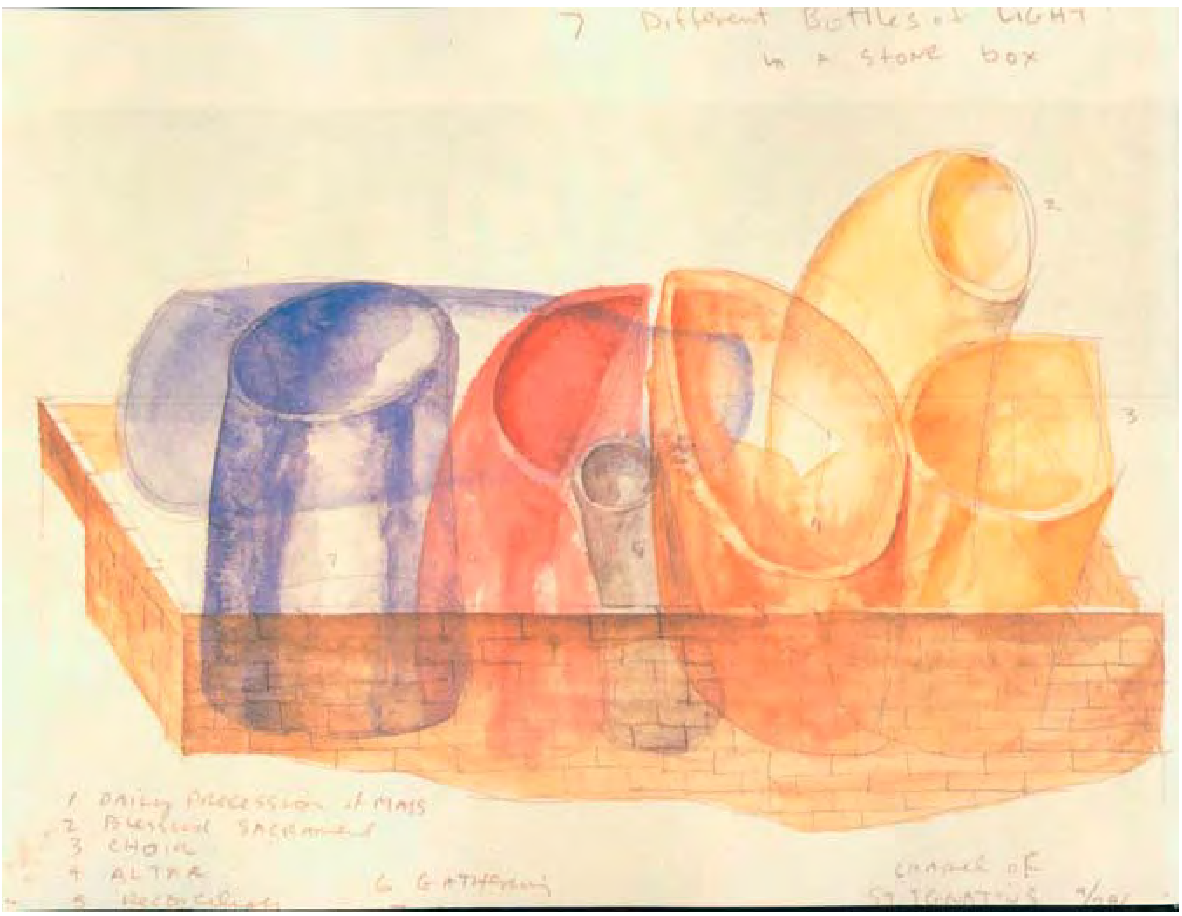


Figure 4: Seven Bottles of Light Watercolor by Steven Holl (Holl, 18)

Figure 5, locates the seven bottles of light and the distinct moments that are 'highlighted' by light. Segment 1 (image c), the entry sector, highlights where the ground is slightly sloped up, providing a hierarchy for the chapel space to which it leads, and the passing of the four windows, or translucent panels which signify the four parts of St. Ignatius' text "The Spiritual Exercises; Conversion, God's Indwelling, Christ's Laboring, and Resurrection" (figure 6) (http://www.seattleu.edu/chapel/tour/slide/12.html).

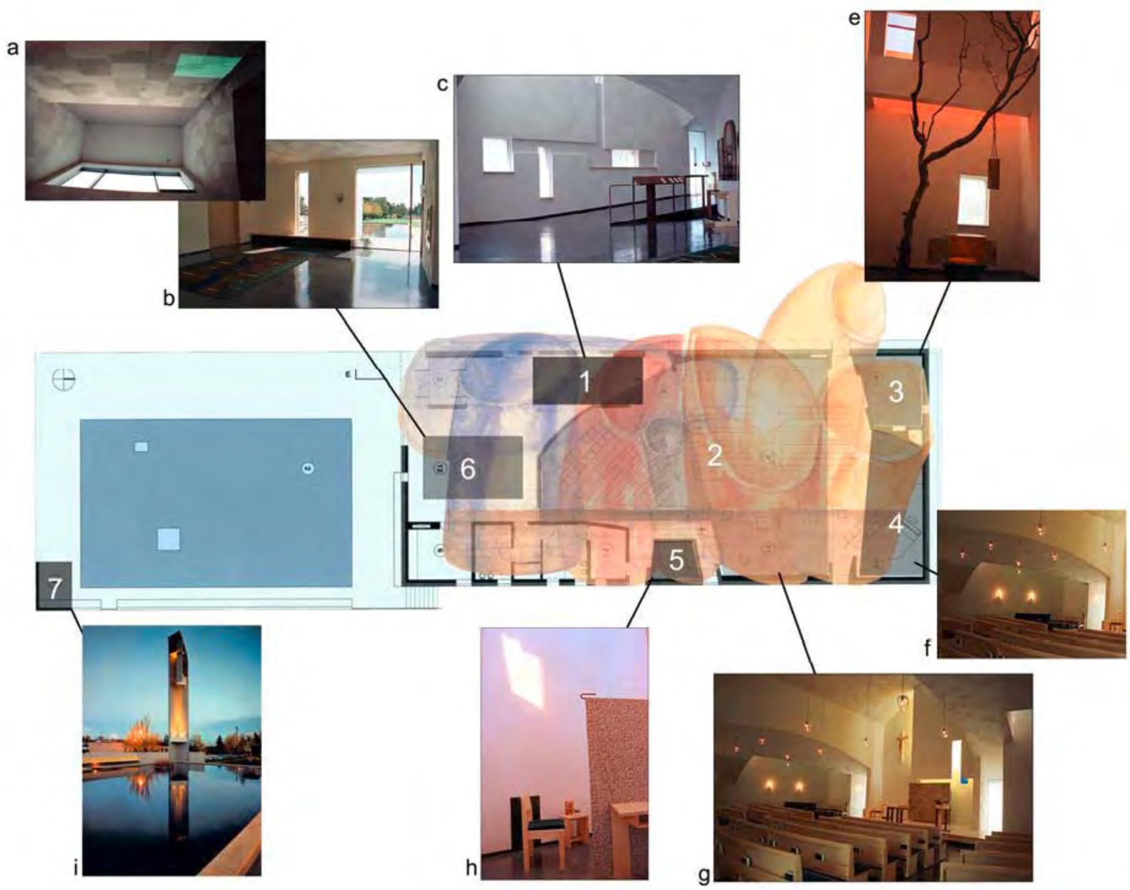


Figure 5: diagram of the seven bottles of light according to plan, by author, images from http://www.seattleu.edu/chapel/tour/.html

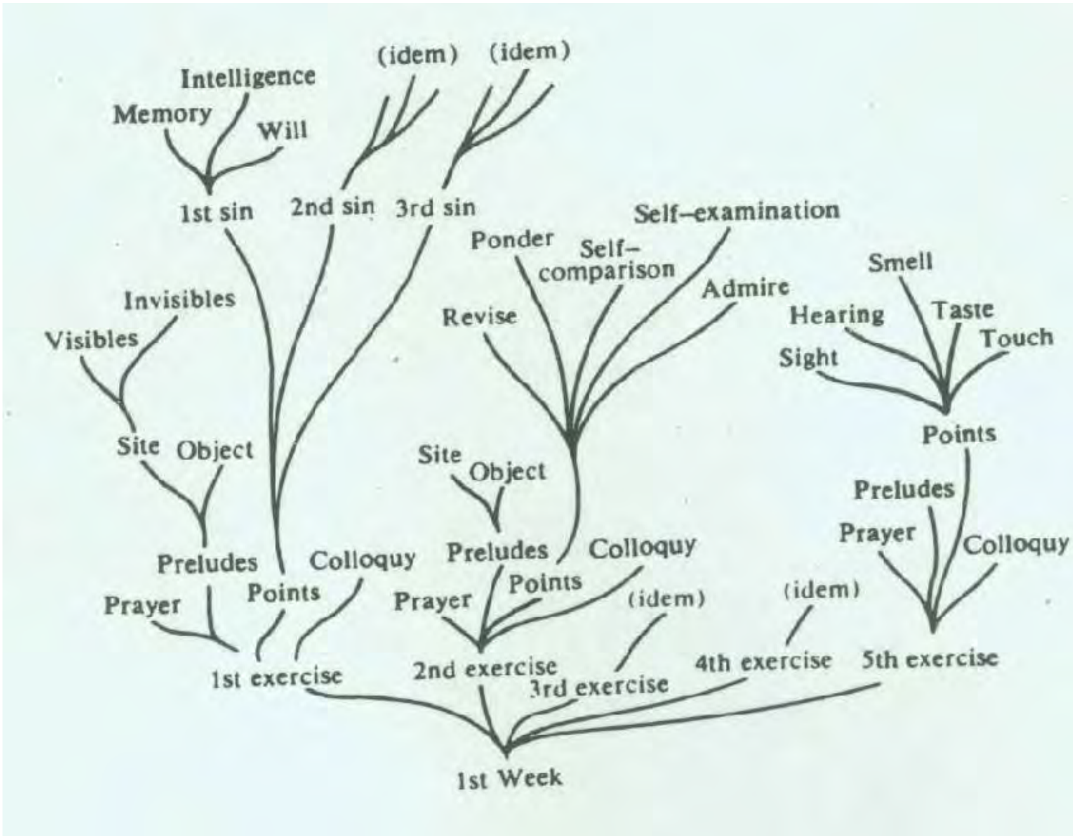


Figure 6: diagram of the spiritual exercises by Steven Holl (Holl, 67)

The holy basin at the end of space 1 is lit through a translucent panel stretching from floor to ceiling. With an even illumination of light the reflection off the water is pristine, disturbed only by the circulation pump. This water, a metaphor of “living water,” baptizes or marks a Christian accepting the faith, bathing them in an even illumination no matter the time of day (Figure 7). The procession through the sacristy, space 2 (image g in figure 5), is guided by the west and east facing light. Either end holds a suspended volume that covers the larger void such that no direct light enters the space. Smaller voids punch through this volume to enhance the space further and give the illusion that these volumes almost float. The north-facing light “corresponds to the Chapel of the

Blessed Sacrament and to the mission of the outreach to the community" (space 3, image e, figure 5) (www.stevenholl.com). Like the sacristy, the Blessed Sacrament space is devoid of a means of viewing the passage of time. These spaces are reserved for the individual and collective moments of worship, which do not need the vision of time. The choir space, space 4 (image f, figure 5), illustrates the passage of time as the sun enters the green glass window, casting a green box that travels the surface of the wall as time goes on (figure 8). By altering the "on axis" approach that the Jesuit Catholic faith previously had to abide by, the entry sequence serves as important as the activities within.

Figure 7: Holy basin by Seattle University (http://www.seattleu.edu/chapel/tour/slide/18.html)

Figure 8: choir space time illustration (Holl, 94)

The Reconciliation Chapel, space 5 (image h, figure 5), is a private space where a sinner seeks forgiveness through his priest. This space also articulates the passage of time, allowing its patrons to visibly see that the sun is moving without actually giving the exact hour away (figure 9). Figure 9 shows how, within this space, the light cast upon the arched wall changes as time passes. Not only does the light move on the wall, but the color changes; the early sun resembles a yellow glow whereas the evening sun reflects an orange tint. This visual embodies the metaphor that with time comes forgiveness and change.

At the narthex, space 6 (images a and b, figure 5) the worshiper is encouraged to study St. Ignatius and what he represents. The translucent glass overhead (figure 10) illuminates the paintings that depict his travels (figure 11) and frames views out toward the reflecting pool, the bell tower, and the campus beyond. It is the only space within the structure that has transparent glass for outward views; everything else remains internally focused.

The bell tower (space 7, image i), the final bottle, is considered by Holl to be a beacon that calls "all people to a sense of pilgrimage or sacred procession. [Also surrounding the tower is a] grass 'thinking field' and reflection pool, two important sites for prayer and reflection" (Holl, 10).

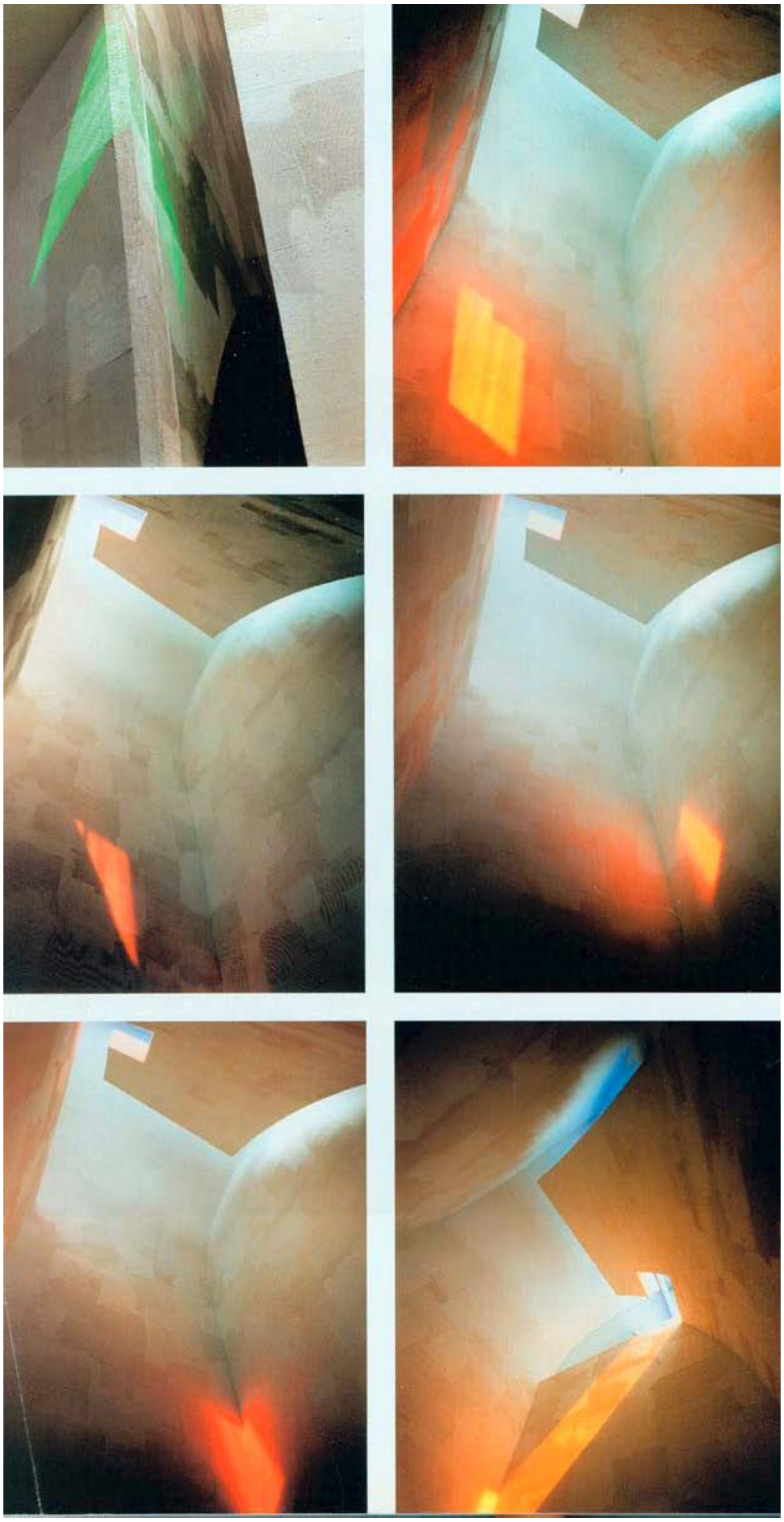


Figure 9: reconciliation chapel by Kenneth Frampton (Frampton, 316)

Figure 10: narthex ceiling by Seattle University (http://www.seattleu.edu/chapel/tour/slide/17.html)

Figure 11: narthex space toward sacristy by Seattle University
(http://www.seattleu.edu/chapel/tour/slide/13,html)

Light is the essence of this space, perceptually acting as a means of awareness to oneself and the connection with one's faith. Here light is a substance captured, manipulated, and used to define separate interior spaces. Figures 12 and 13 show where each section is cut, while the plan illustrates how light illuminates the space. The following sections demonstrate the way in which light is redirected through the structures sculptural ceiling form. This light cast on white walls gives a floating feeling, as if each wall is seemingly unattached to its counter. The following diagrams give reference to where the source of light for each space comes from and how light is diffused through the space.

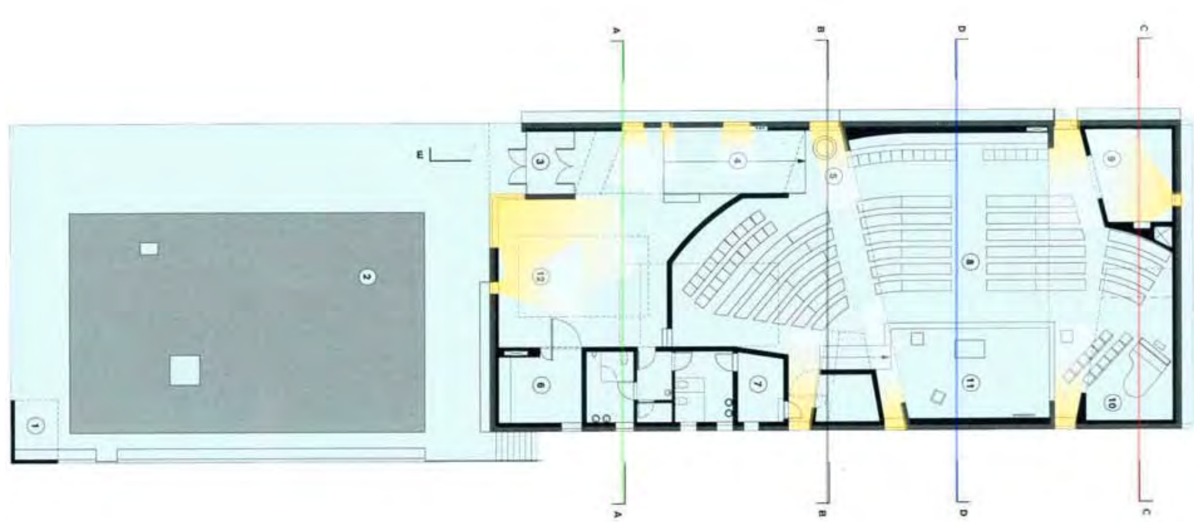


Figure 12: diagramming light penetration at floor level, with section cuts (plan from Frampton, and diagram by author)

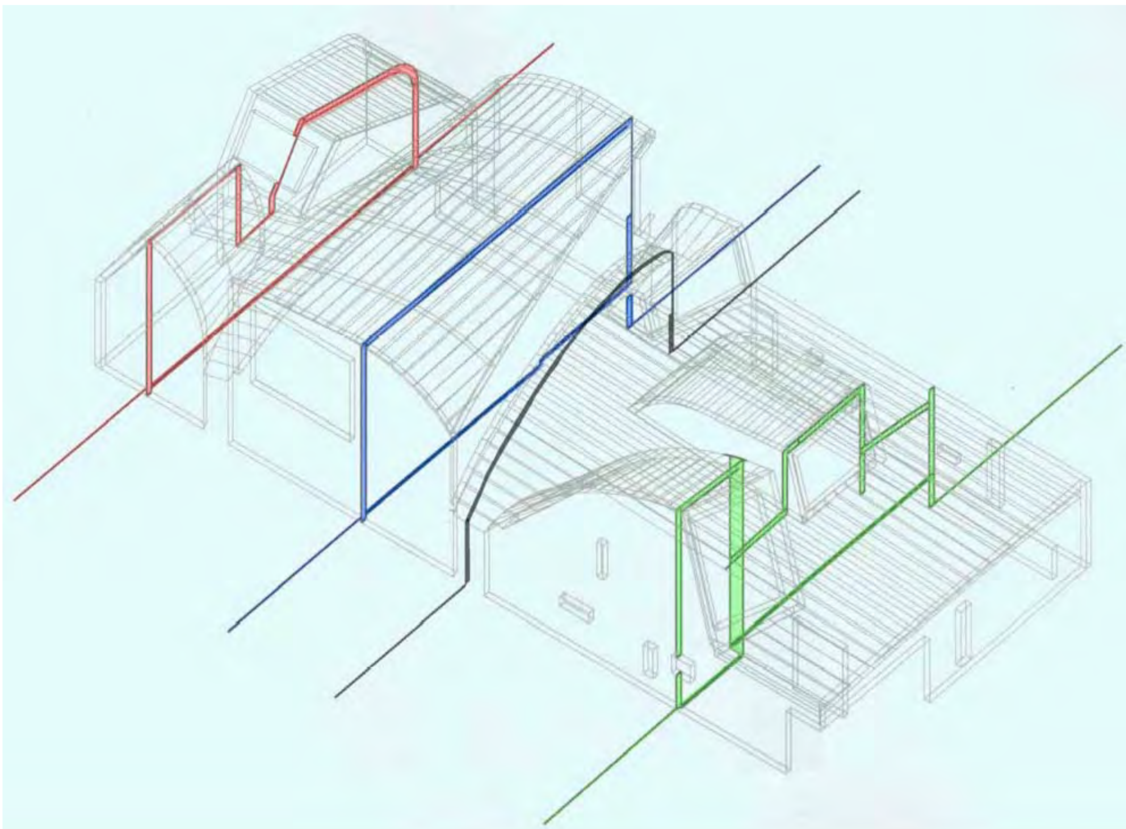


Figure 13: axon illustrating spatial forms and section cuts (by Steven Holl, colored by author)

In the green section, which faces the south entrance there is a direct illumination as transparent glass windows reflect off the highly polished concrete floor (figure 14). The entry space uses open views and light from above as a means of highlighting the door and procession through the space. The higher translucent windows are used to bring in light (images a and b), where the lower windows frame the bell tower and reflecting pool respectively (image c). Between the concrete floors and the white stucco walls, the light bounces through the space highlighting its entry.

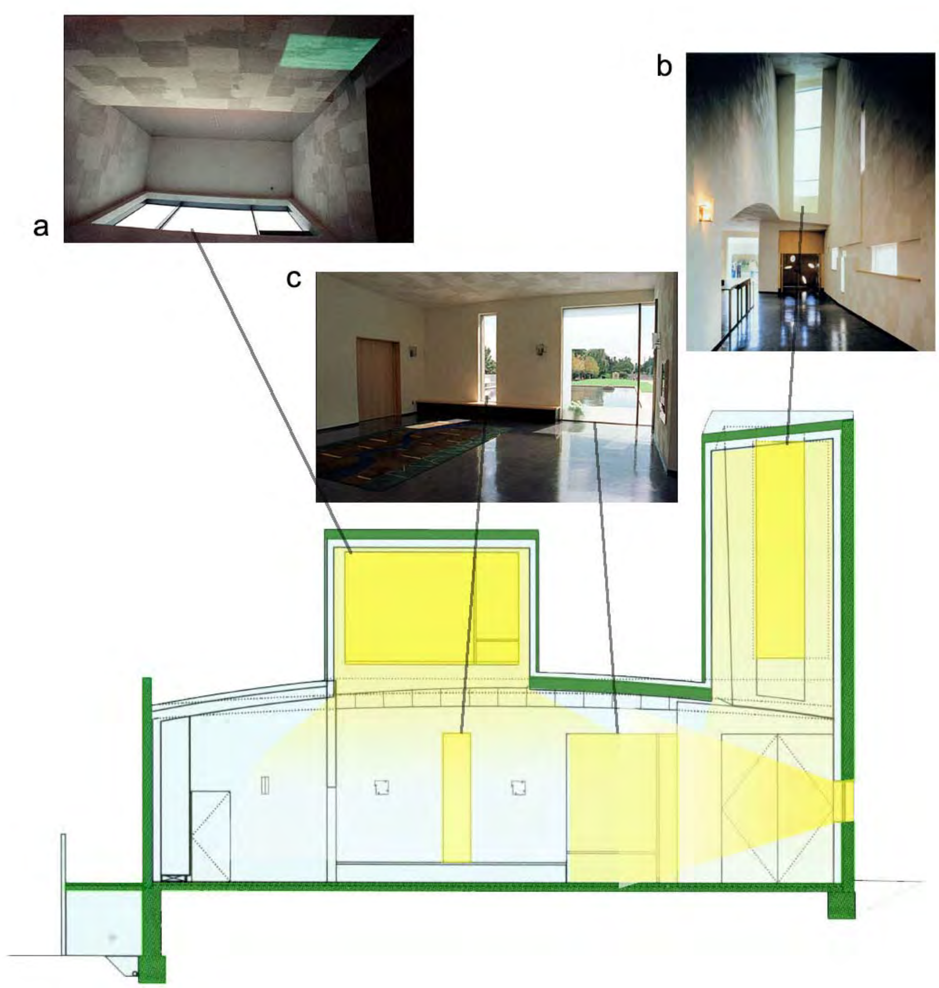


Figure 14: illumination section through narthex and processional corridor (diagram by author, pictures from www.flickr.com)

The grey section through the Baptistery (figure15) displays the floor to ceiling translucent panel (image b), which delineates the space from its surroundings as something unique, a moment for pause. The panel uses a diffuse light for an even illumination on the holy water. The light sliver to the left (image a) illustrates the wall separating the narthex from the sacristy and the radiance given from that space, which is used to illuminate part of the sacristy. The effect of the curve ceiling above is to bring light in indirectly. This filters the light across the ceiling for a more constant illumination, creating an overall glow allowing its patrons to stay focused on prayer and reflection while in the sacristy space.

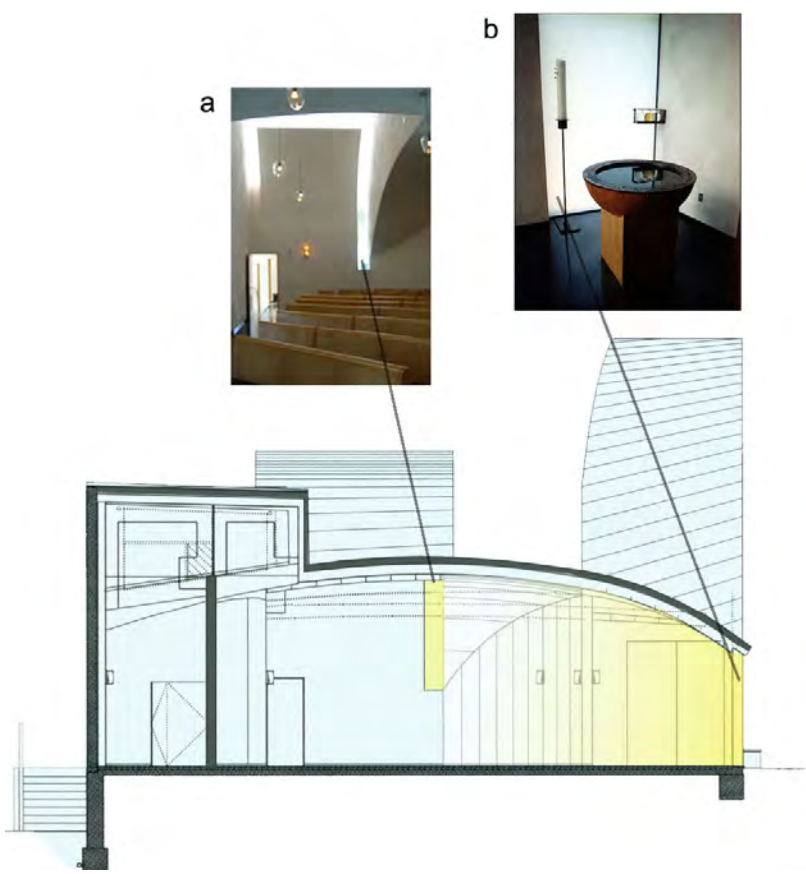


Figure 15: illumination section through holy basin and south side of sacristy (diagram by author, pictures from www.flickr.com)

The blue section through the sacristy (figure 16) focuses on the altar with its lifted platform and directed light (image b). The space behind the sacristy gains importance as it is seen from the entry and directs the eye entirely through the interior to the Blessed Sacrament Chapel (image a). The curved ceiling rolls the light down to provide an even illumination on the congregation. The light coming from behind the altar is more direct and focused on the priest bringing the congregations focus toward him. The light within this space has been manipulated such that there is an equal, yet distinct, focus on the congregation while highlighting, and bringing attention to the alter.

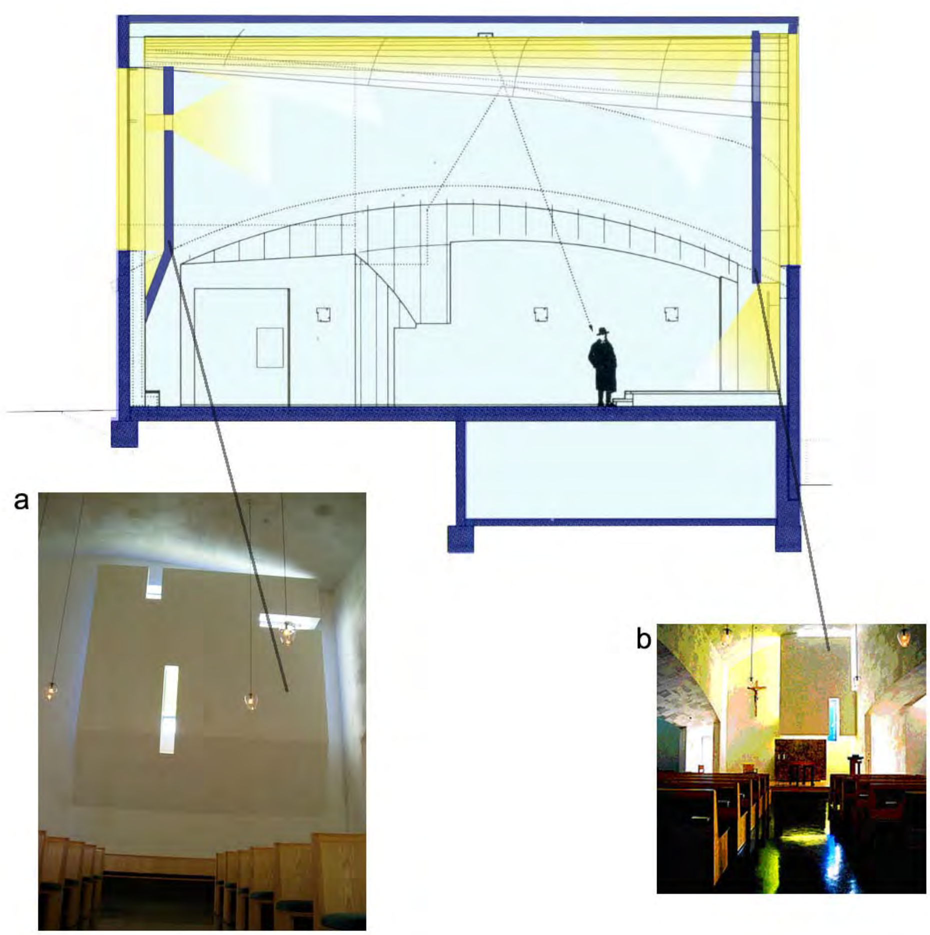


Figure 16: illumination section through Sacristy (diagram by author, pictures from www.flickr.com)

The red section, through the Blessed Sacrament Chapel and the Choir space, (figure 17) reveals the way in which light is reflected and bounced off surfaces to illuminate and differentiate the spaces. The Blessed Sacrament holds the ‘tree of life’ (image a) and uses a revealed opening to bring light in. The choir space holds the area where sacred music projects (image b) and uses a concealed opening to reflect light for an overall, even illumination. The folding of the wall surfaces allows light to penetrate indirectly into the spaces. Indirect light is used within this space to allow the individual to take focus on their own internal spiritual awareness.

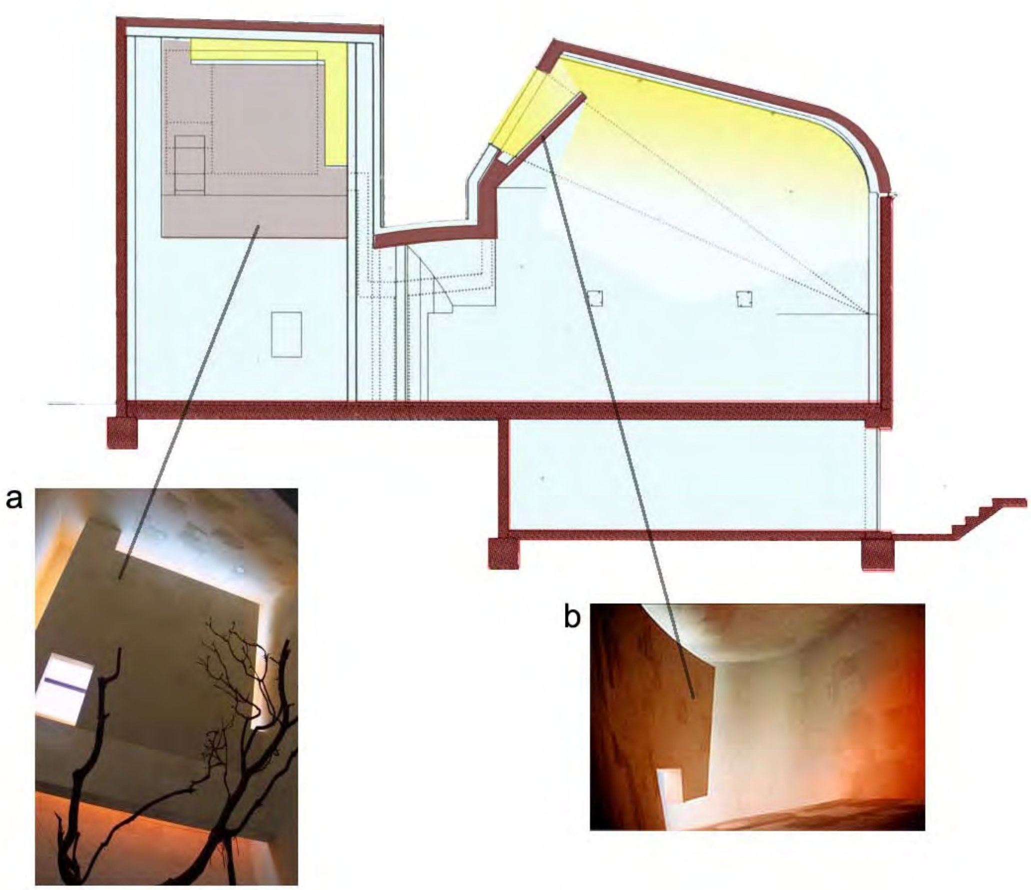


Figure 17: illumination section through Blessed Sacrament and choir space (diagram by author, pictures from www.flickr.com)

Figure 18, the longitudinal section exemplifies the importance of the curved ceiling and the attachments to the walls that direct light through giving each space an even distribution of light without direct views out. Restricting the views keeps the attention and focus of the users inward, allowing their concentration to remain on their faith.

The texture is clearly enhanced by the angle of inclination. As seen in figure 19, the front door, the light highlights the woods texture when it is slightly cracked. Because the texture is not seen when the door is closed, the appreciation for it comes at specific moments when people are circulating through the threshold. The crucifix image, figure 20, shows the expression of time through a fifteen minute change. Even though the shift is subtle the shift in emotion and visibility of texture is strong. The texture on the wall no longer looks flat, but begins to recede and expand forward giving it shape and a drama, highlighting the holy figure.

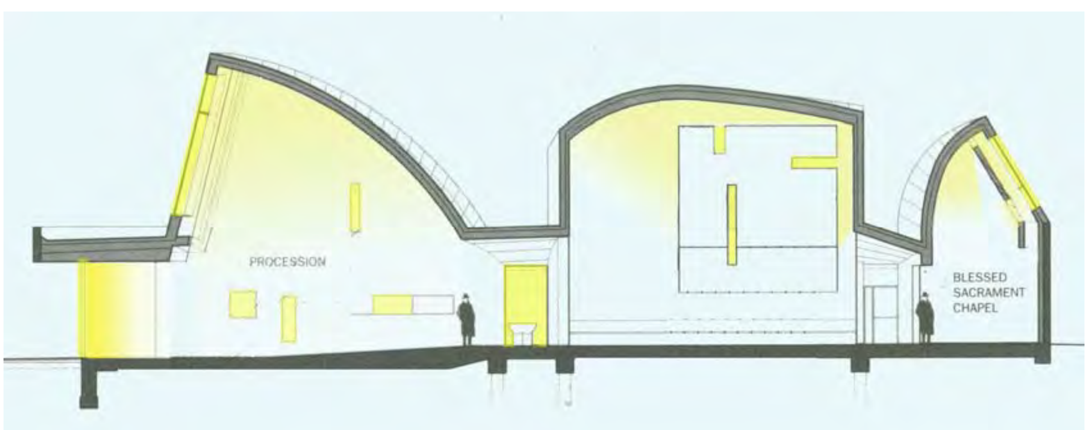


Figure 18: north south section illuminations through chapel (diagram by author)

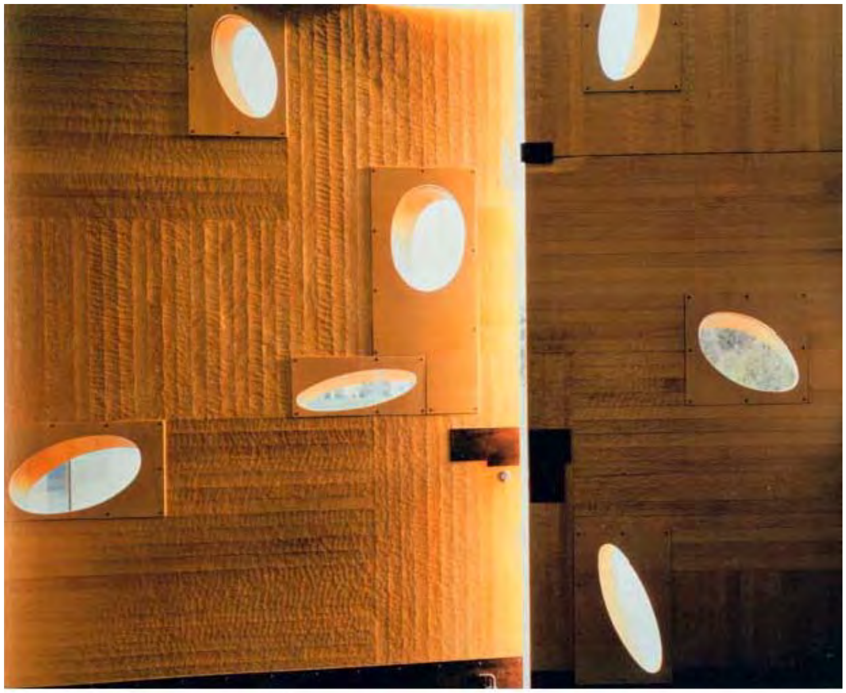


Figure 19: textured front door (by Frampton)

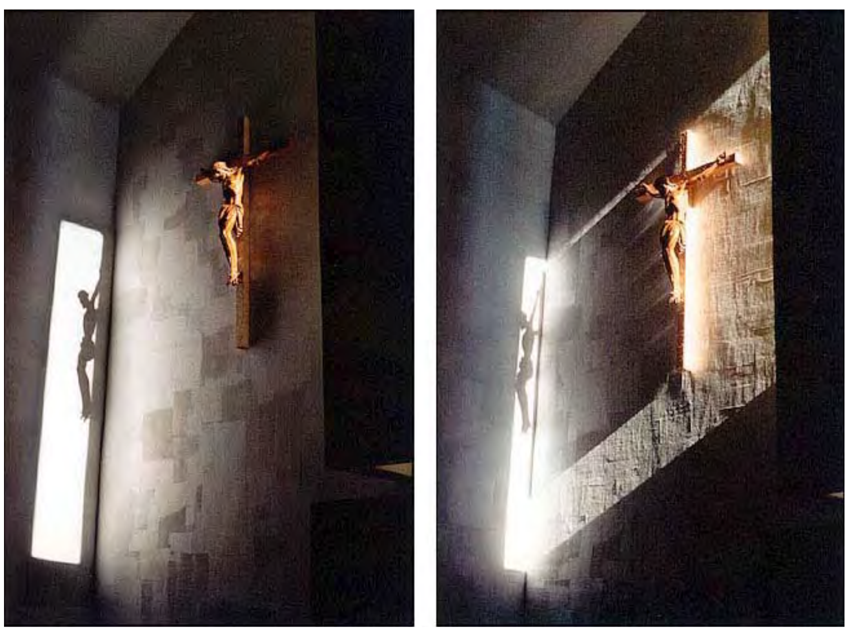


Figure 20: the crucifix at 12:00 pm (left) and 12:15 pm (right) both in November
www.seattleu.edu/chapel/tour/slide/36.html www.seattleu.edu/chapel/tour/slide/37.html

Its not only that this is a sacred place, a place of worship, a Chapel that provides a sense of euphoria, but it's a place of peace, shaping light to guiding one through its volume and time. Steven Holl uses the architecture of St. Ignatius to manipulate light. The revealed versus concealed openings within the ceiling, the open views our versus the light from above for directed focus, the overall illumination versus direct, focused lighting (such as the altar space), the indirect illumination versus the angle of inclination to reveal texture and detail focus; these conditions are all used within the church to heighten awareness and alter perception for the individuals within the space.

Church of the Light, Tadao Ando

Tadao Ando uses both simple forms and voids to effectively contrast light and shadow. He utilizes materials to get a contrasting effect at a more detailed level. He concentrates on restricting light and views such that the light which pierces the space is conceived as spiritual. Ando's structures use their form in secluding the sacred space from the profane. On the Church of Light the resulting spatial qualities of these parameters dramatize emotions, enhancing the personal experience. Through his attention to solids and voids with the simple materiality of concrete, lights ephemeral qualities are embodied.

Ando designs his buildings to be experienced, putting emphasis on procession and surprise (Drew, 4). Philip Drew claims in his book <u>Church on the Water, Church of the Light: Tadao Ando</u>, "through his work, Tadao Ando expresses the dual nature of existence. At the intersection of light and silence we become aware of 'nothingness', a void at the heart of things…Light is the

special medium which he uses to clarify the emptiness in his architecture" (8). Using simple cube forms, Ando stresses the importance of providing architecture with an order in contrast to the city, which he deems chaotic. Ando designed the Church of Light around a concept of dual nature and order, studying what it meant to provide a sanctuary in a dense urban environment (figure 21).

Ando sees nature as the seam between religion and the spirit, however, because this church is located within a dense urban setting the focus becomes internal for its patrons, using the voided cross at the front as a source of light (figure 22). Philip Drew, in his book Church on the Water, Church of the Light: Tadao Ando describes the message of light from the cross;

> "In the Church of the Light, the cross-shaped opening at one end becomes the door to the world above, through which the gods can descend to earth and man can symbolically ascend to heaven. Allied to light, which symbolizes the divine, the austere expression of the cross as an opening in the wall makes it a kind of communion with heaven, an opening through which a symbolic passage is possible" (Drew, 11).

Figure 21: church of light in context (photo by Furuyama)

The procession of the space functions as a way of gradually separating the sacred from the profane. The entry sequence is indirect for the purpose of heightening awareness and expectation as one proceeds from the urban environment. Once within, the light takes central focus where it accentuates the expression of emptiness, leaving spirituality and purpose to take focus. The simple form encloses a space within the city for peace and serenity. The wall is the separating device for Ando. As a means of containment, it controls light and views in such a way that the source of light is not read as a window, but a void (figure 22). With the compression felt by the chapel space darkness, the light from the front cross offers a release, a break from the tension (image h figure 23) (Drew, 18).

Figure 23 illustrates the containment of the sacred space. The voids that face toward the city are only wide enough to let light in (images a, d, and h figure 23). The voids that are wide enough face another concrete form allowing a diffused light into the space (images e and h figure 23).

Figure 22: voided cross at front of nave space (photo by Vignelli)

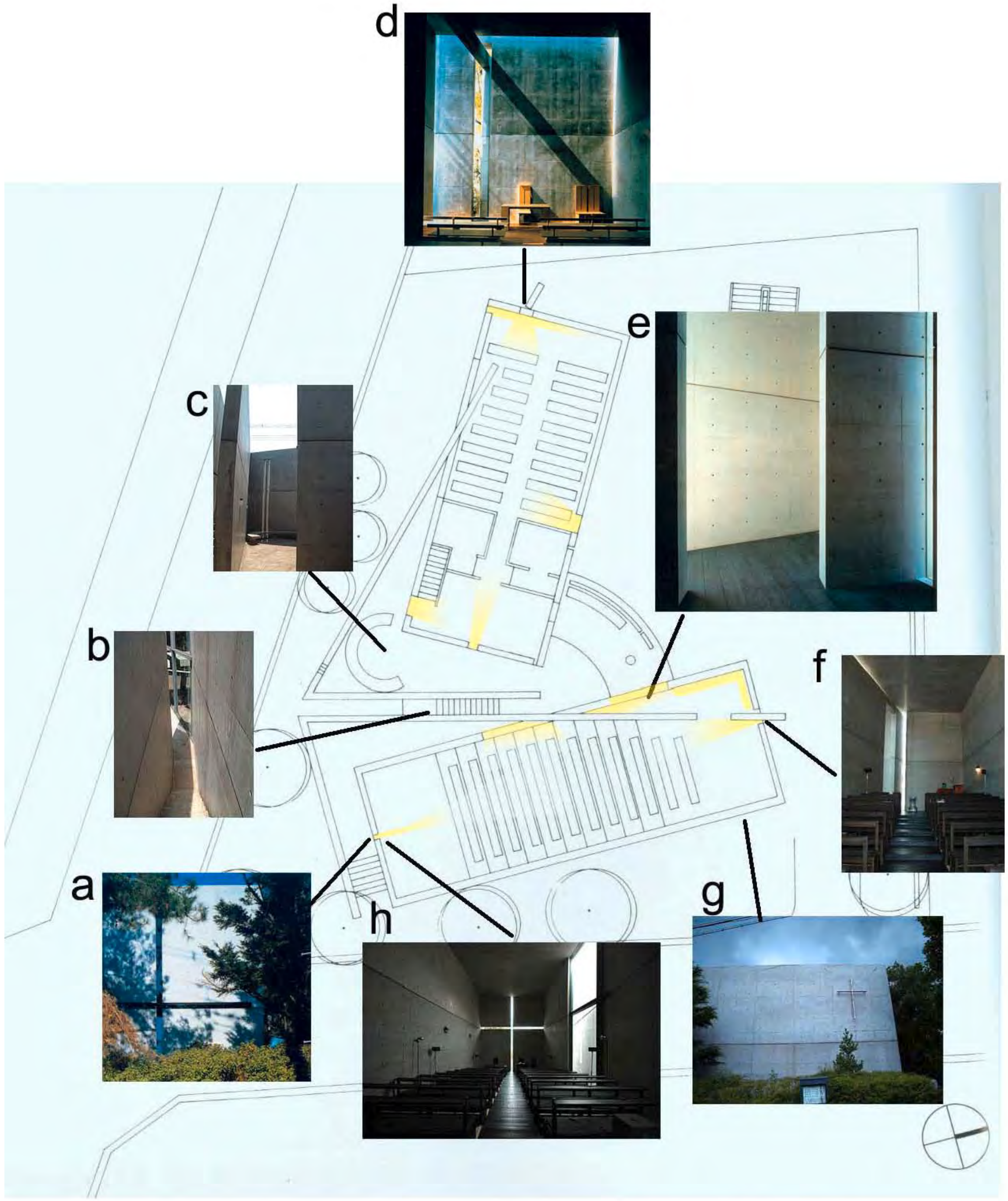


Figure 23: site plan containing important lighting moments (diagram by author, pictures from www.flickr.com)

Unlike the Chapel of Saint Ignatius, Church on the Water only uses transparent glass. Ando uses the ephemeral qualities of light to consistently change the experience of the space. Depending on the hour, season, and even climate, the light cascades across the polished concrete of the interior walls such that it illuminates the space while displaying the passage of time (figures 24). With small slices, or voids, at both the north and south section, light pierces across the ceiling (figure 25). Another source of lighting comes from the slit where the walls and ceiling do not meet along the east side (image b figure 26). The section in figure 26 illustrates the main light sources for the nave space.

Figure 24: Cross at roof detail (photo by Drew)

Figure 25: cross at wall detail (photo by Drew)

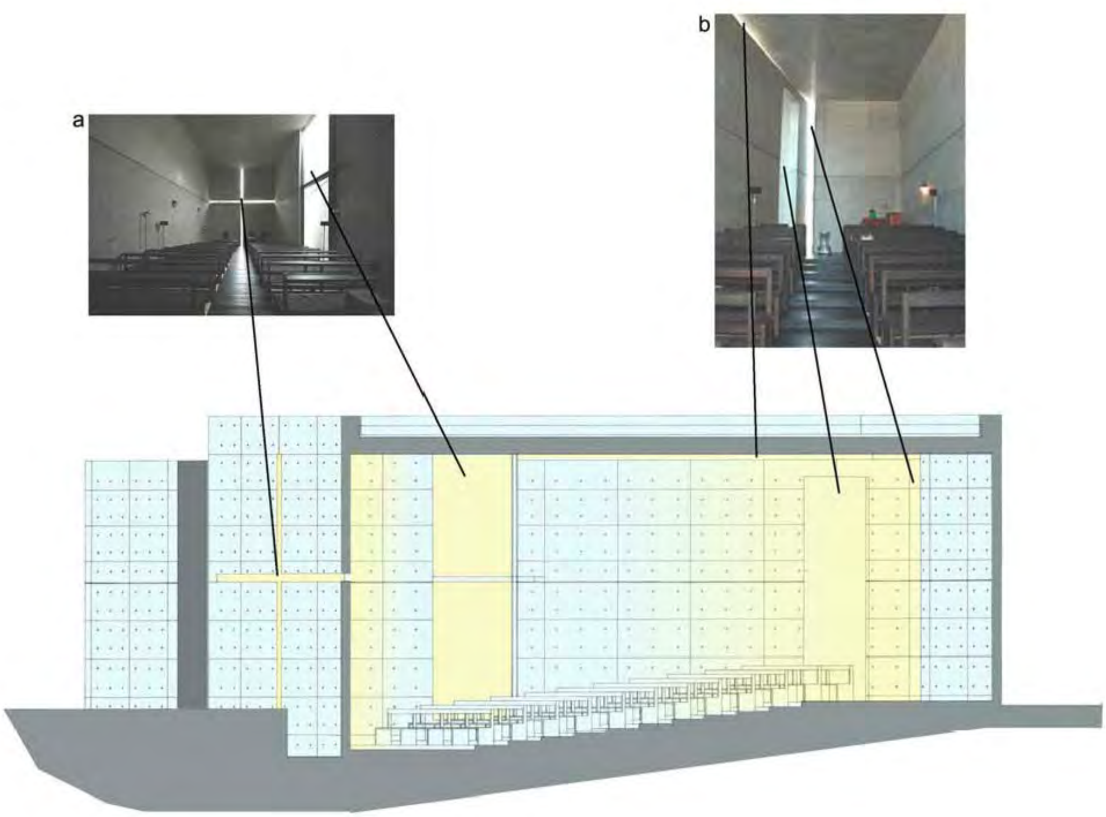


Figure 26: north-south illumination section through nave (diagram by author)

Ando's use of materials creates the emotional shifts of the building's users by the dramatic effect given off by the light. Figure 27 illustrates the simplicity of the smooth cast-in-place concrete affected by light grazing its surface. Figure 28 shows the properties and imperfections of the wood along the floor and seating as the light enters through the south side cross. Figure 29 shows the variance in the use of lighter materials, representing a less vivid effect from light.

Figure 27: image showing light reflection off glass (by Vignelli)

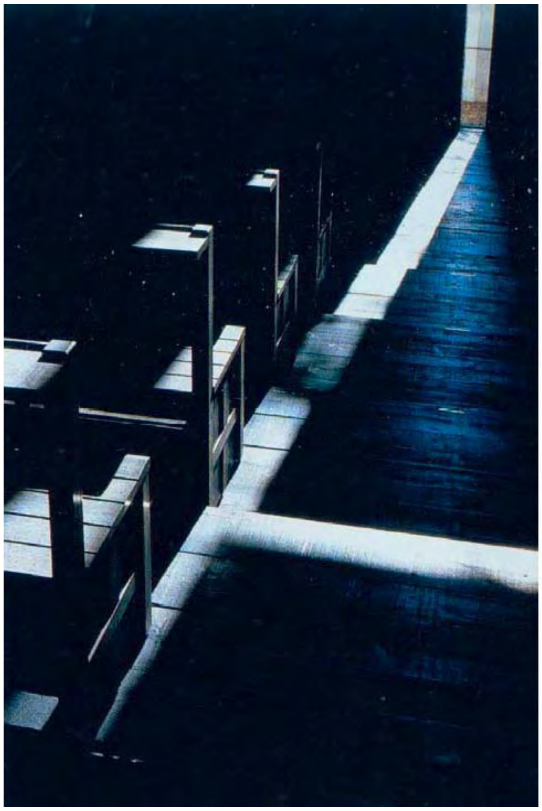


Figure 28: intensification of light against darker materials (photo by Vignelli)

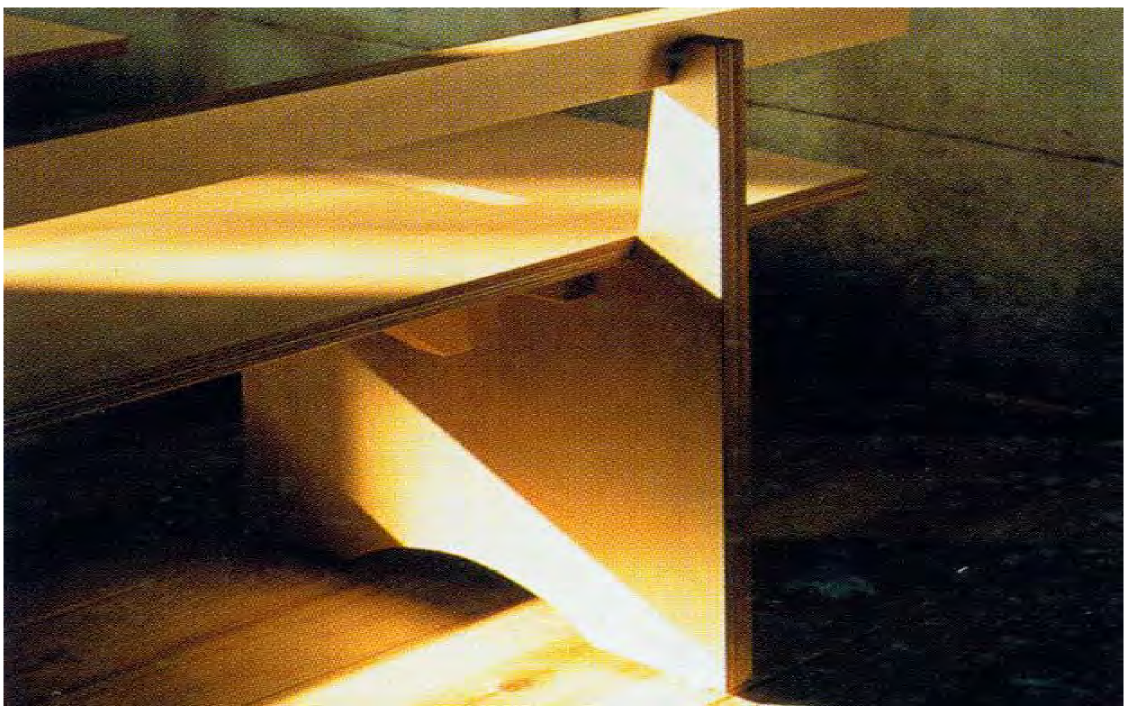


Figure 29: intensification of light against lighter materials within the Sunday school sapce (photo by Vignelli)

The high walls guard its users from the city, creating a barrier and a sequence for entry (figure 30). For Ando, the lighting is not about an even distribution or illumination, but rather, the intense shift of the bright light against the dark interior in attempt to disembody the spirit from the chaos of the city.

For Holl and Ando the experience of their churches comes from the clear manipulation of light. Their architecture becomes about the user, and the distinct way in which light can direct or indirect focus. Light connects the user to their inner spirituality, altering their level of reality or perceived existence.

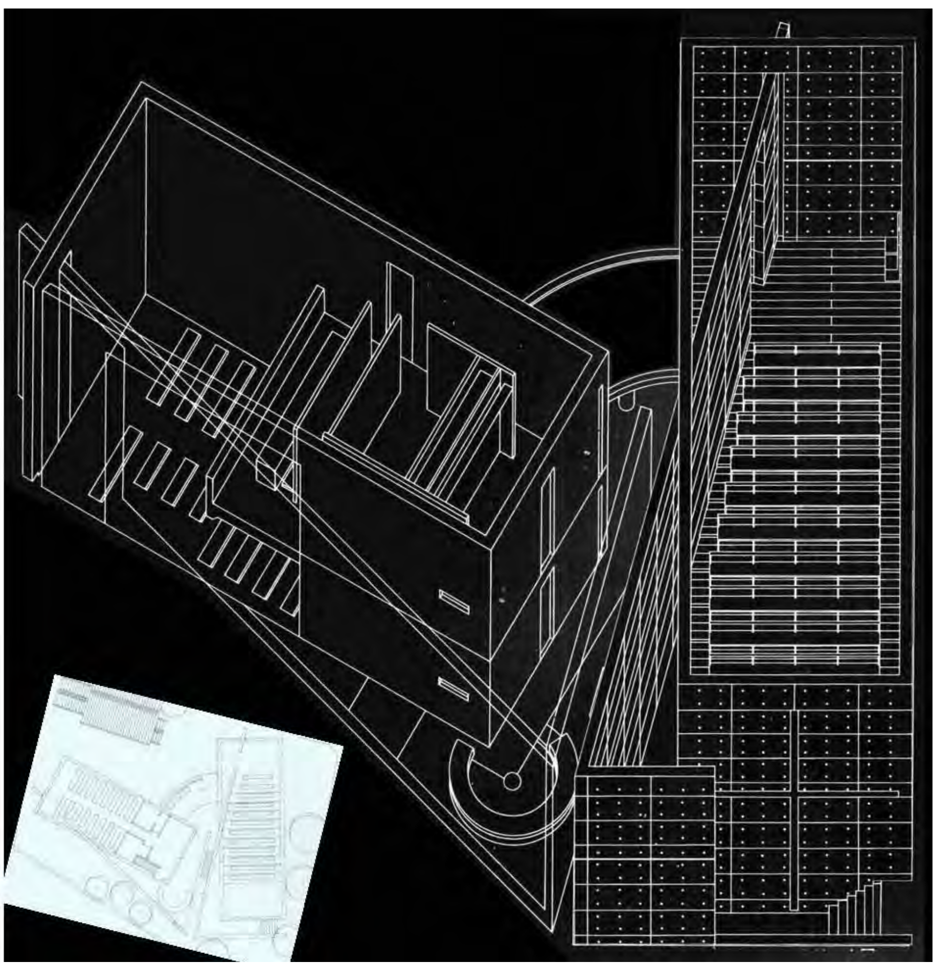


Figure 30: axon diagram of chapel space (right) and Sunday school space (left) (by author)

CHAPTER IV

Light in Profane Spaces

Light within profane space uses other metaphors in the concept besides the ‘heavenly light’. Though the concept, the focus remains on an emotional connection between light and its user heightening awareness and altering perception. Programmatic functions and the site typically generate the spaces and buildings form. Without the association to a faith, a new connection must be established, one that any occupant can feel, apprehend, and appreciate. This occurs first in the initial concept and how well it is carried through the site selection and its relation to the program. Light connects to its users because every person has the general knowledge that light provides life, and every person needs light to see. As in sacred space, profane space manipulates light through texture, solids and voids, opacities, transparencies, and translucencies. The architect uses lights characteristics, intensity, contrast (sharp or blurred), color shifts, and temperature to heighten awareness and shift an emotional condition.

Thermal Baths

> “I believe that [materials] can assume a poetic quality in the context of an architectural object, although only if the architect is able to generate a meaningful situation for them, since materials in themselves are not poetic.
>
> The sense that I try to instill into materials is beyond all rules of composition, and their tangibility, smell and acoustic qualities are merely elements of the language that we are obliged to use. Sense emerges when I succeed in bringing out the specific meanings of certain materials in my buildings, meanings that can only be perceived in just this way in this one building.”
>
> -Peter Zumthor *Thinking Architecture*, 11

This quote refers to the careful contextual choice of materials, testifying the idea that using a material with connections to site, visuals, or program can enhance the meaning of a space through its significance. These materials are

highlighted by the way light enters the space. Using lights angle of inclination to either graze across the material emphasizing its texture, or centrally locating the light source such that the space is illuminated more evenly. Peter Zumthor's Thermal Baths exemplifies this idea, carefully laid out in plan such that the form provides a means of blending into the site. Built into the landscape, devoid of any light that is not intentionally brought in, the darkness enhances the idea of a cave. Zumthor specifically brings light in to shape the interior space and to bring awareness to specific spaces. The architecture is simple in form, blending in with its surroundings becoming part of its history. Zumthor states in his article *Thinking Architecture,* "I believe that buildings can only be accepted by their surroundings if they have the ability to appeal to our emotions and minds in various ways" (18). Architecture becomes a part of the memory of a place deriving the perceptual shifts from its materiality, form, and means of bringing light into the space.

The Thermal Baths, created from the local Valser quartzite and concrete provides order and creates space further defined by light and water. Dynamically laid out, the spatial concept conceives of the still stone versus the kinetic movement of the person, the water and the light that reflects off it (figure 31). Light and material guides the ritual of bathing, creating the procession through the layout.

Figure 31: material depiction and dynamic interaction of light and water (http://www.galinsky.com/buildings/baths/index.htm)

Exterior walls frame the surrounding landscape, giving views to the undisturbed rock so that while within the space, the occupant feels that the interiors are carved out of its landscape (figure 32). It is this use of openness that connects the individual to their surroundings, where “architecture frames, divides, and centers the landscape and its distinctive features” (Hauser, 30). Voids within the structure allow views out to the landscape, a visual connection or relief from the darkness within. Architecture is a balance of emotion and reason, where light, in combination with water plays a key role in defining the space (figure 33 & 34).

Figure 32: thermal baths exterior wall framing views
(http://www.galinsky.com/buildings/baths/index.htm)

Figure 33: material depiction and grazing effects of light (www.flickr.com by chairman CHUA)

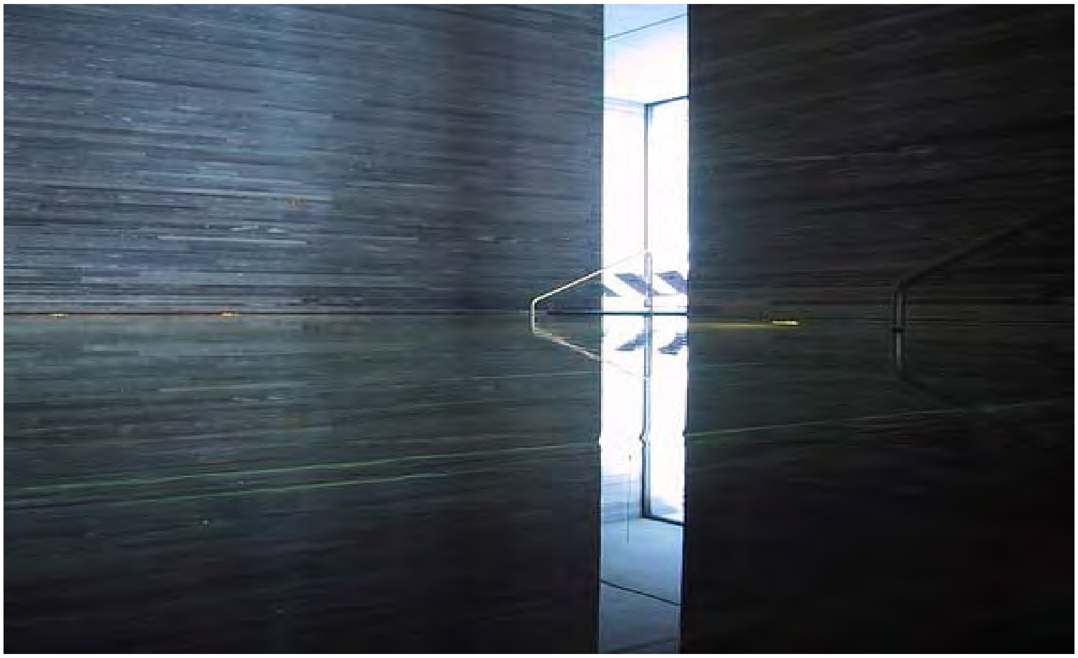


Figure 34: thermal baths light penetration through transparencies, illustrating reflection, (www.flickr.com by nadasdy)

As the plan in figure 35 shows, the general massing anchors the entry into the hillside allowing the baths to protrude out into the landscape. The entry sequence, shown in figure 36, begins underground, secluding all views, using darkness as a means of creating intimacy with the user and the architecture (figure 37 image b). The users then make their way through the individual changing rooms to proceed down the stairs to the central indoor bath. Light wells bring down the light, framing the spaces, giving relief from the dark underground procession (figure 36 image a). The bathing room is also lit by skylights, with a gridded pattern giving an even distribution of light that spreads over the water (figure 38 image c, 39 image b, 39 image c). Glimpses to the exterior bath are framed through the walls until finally users exit the building to the exterior bath, connecting them to the landscape (figure 38 image a).

Zumthor uses light, cascading down the wall, to enhance the form of the stair and articulate the horizontality of the stone. The opaque walls, with their light grey color and smooth finish become the foil for the light piercing through the windows, reflecting it off the stone to aid in the illumination of the space. Peter Zumthor uses a variation of roughly ground, bush-hammered, sandblasted, finely ground, and polished stone to create a dynamic of light that bounces and reflects off the stone in all different ways. This light “streams in along the walls, emphasizing the corners of the room, tracing bright stripes down into the floor, and glinting off the simulated water surface” (Hauser, 32). Light even enters the space under the surface of the water, illuminating it in such a way that it beckons its patrons, guiding them in the ritual of the bath through a succession of spaces.

Figure 35: floor plan of thermal baths showing section cuts, ceiling light slits, and window light (section by Hauser, diagram by author)

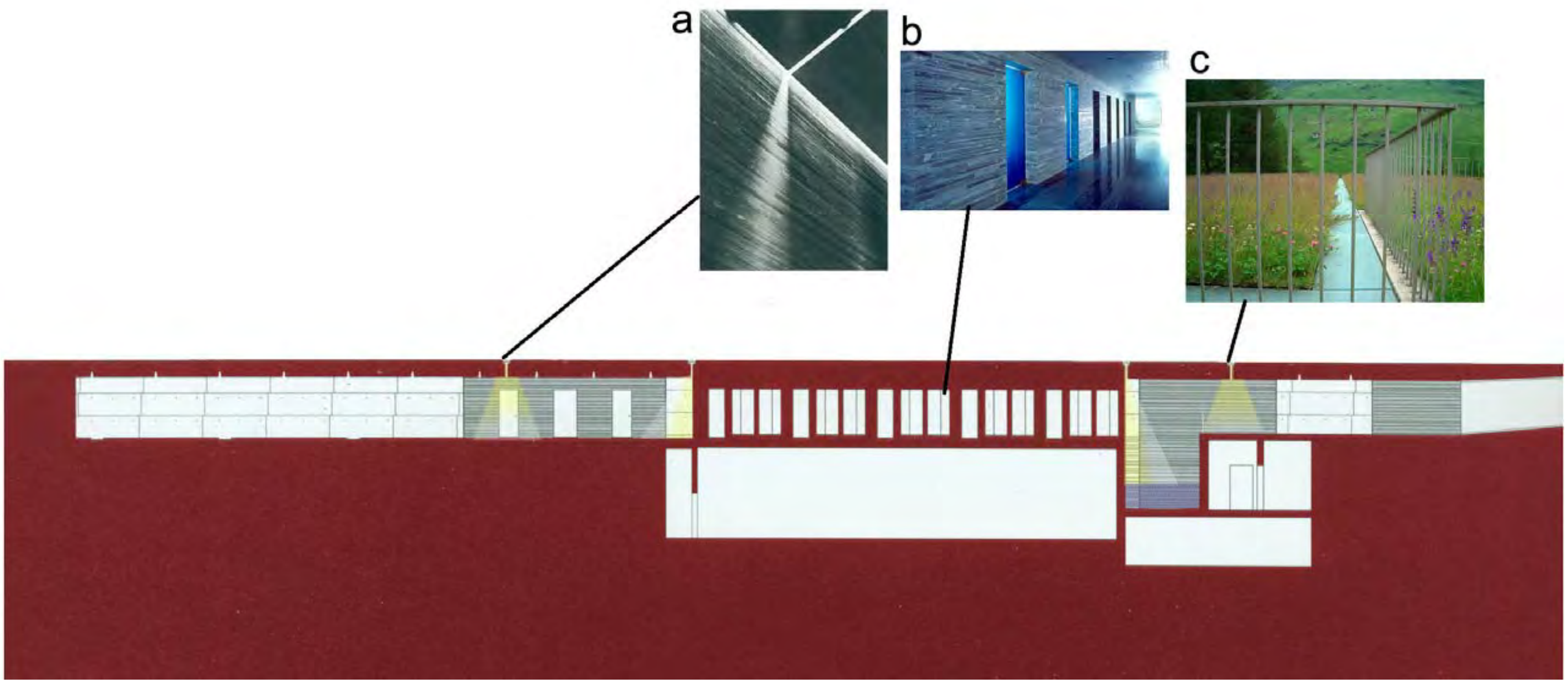


Figure 36: section through entry, changing rooms, and hall to Turkish showers (section by Hauser, diagram by author)

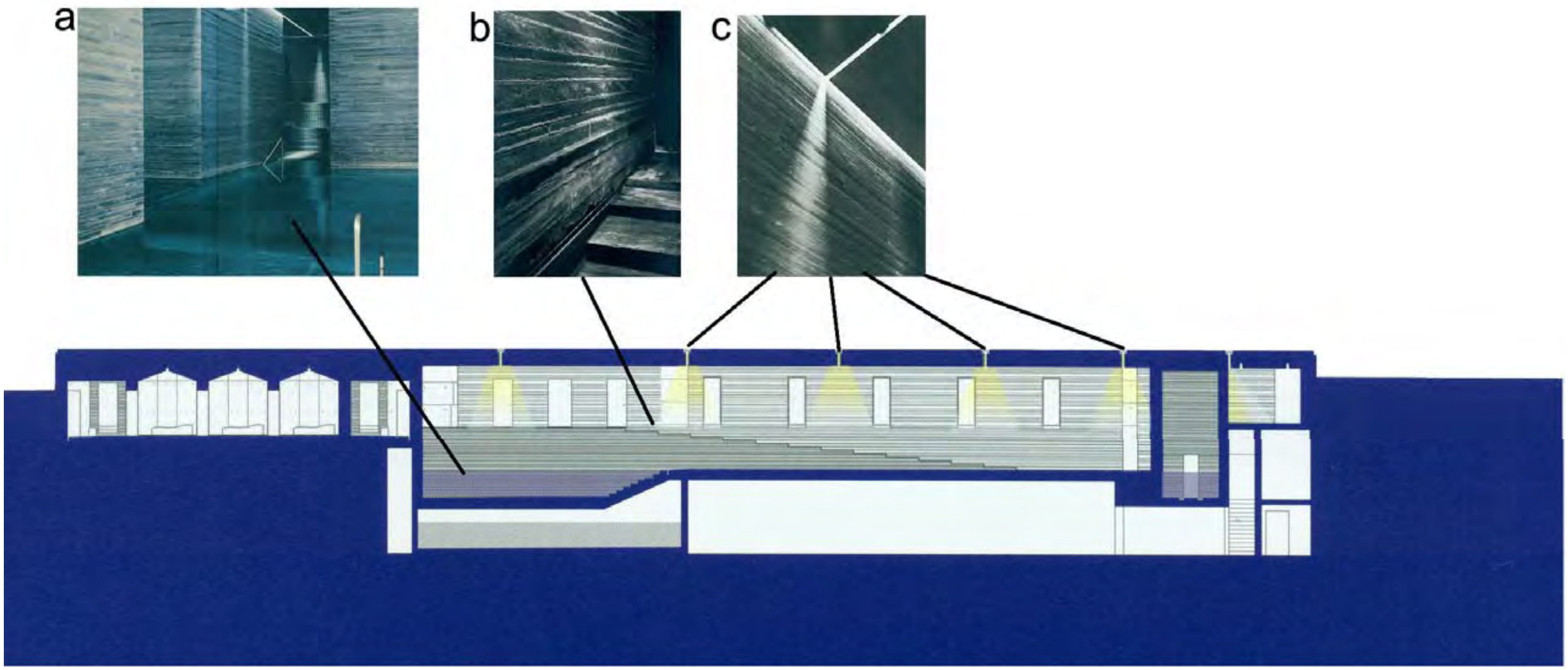


Figure 37: section through Turkish showers, outdoor baths, and sound bath (section by Hauser, diagram by author)

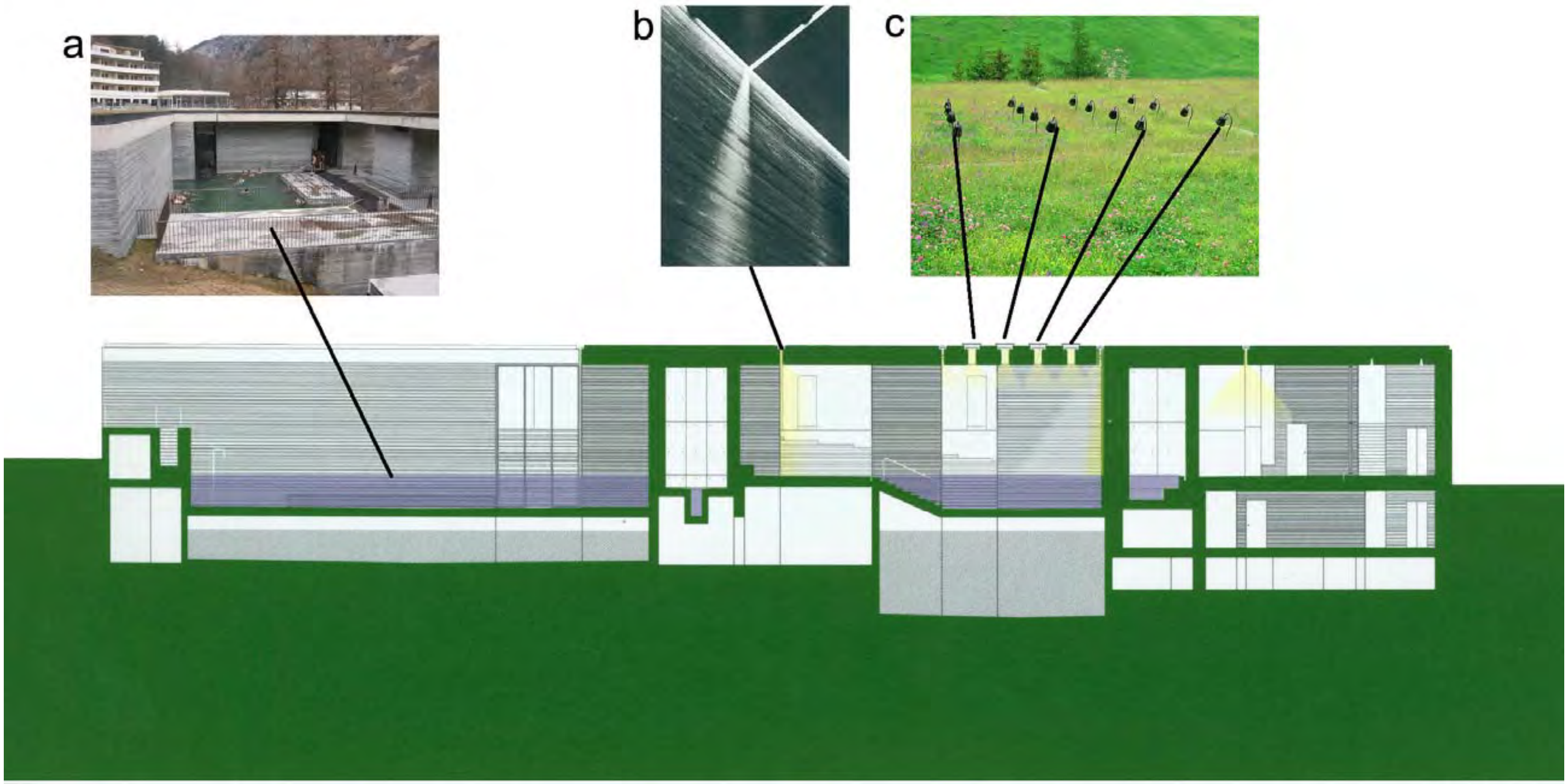


Figure 38: section through rock terrace outdoor bath, drinking stone, indoor bath, and flower bath (section by Hauser, diagram by author)

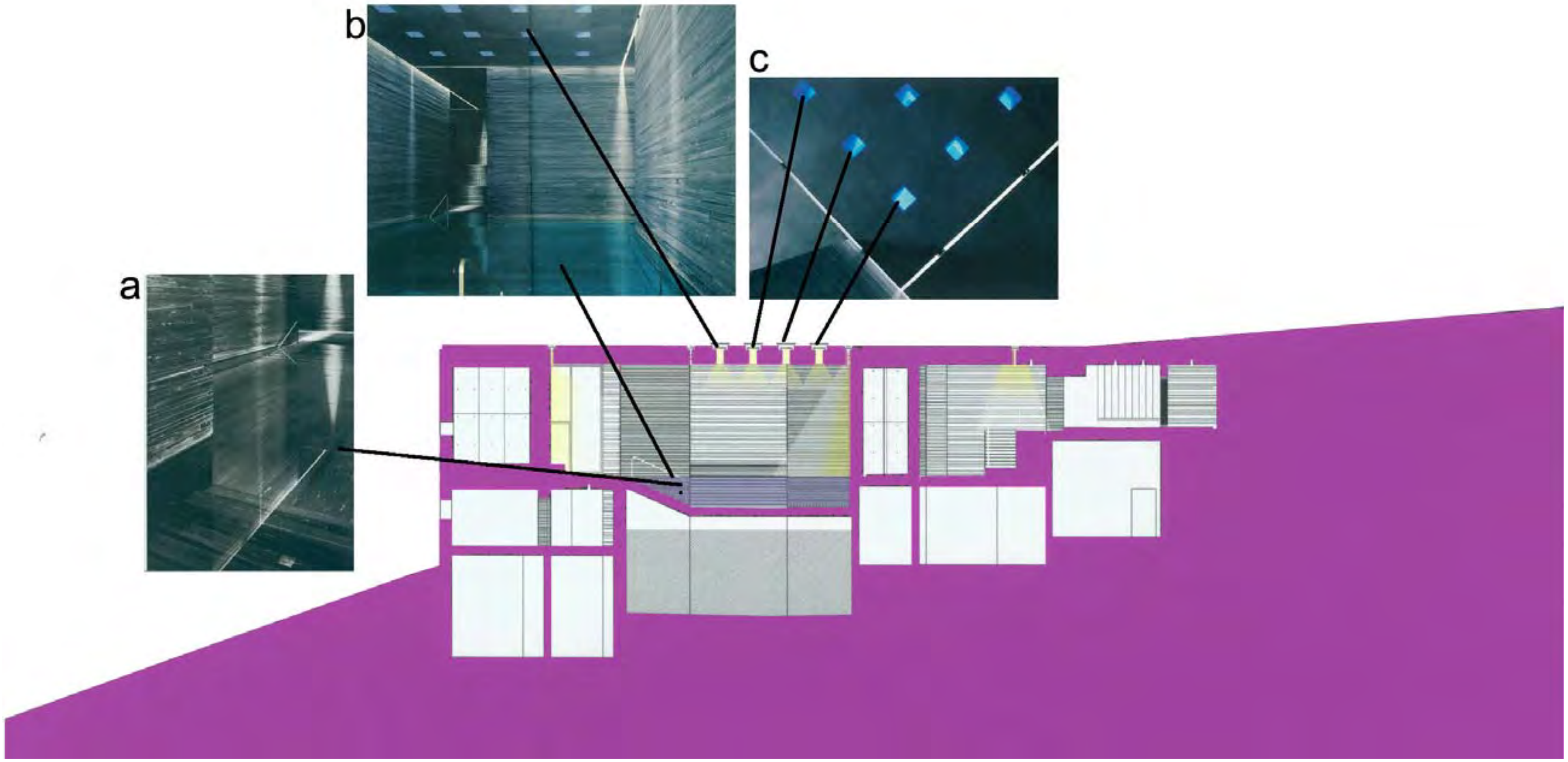


Figure 39: section through massage, indoor bath, shower stone, changing rooms, and hall with spring water, drinking fountains (section by Hauser, diagram by author)

Architects of profane space mainly rely on the users, the program, and the site to generate the metaphor for design. Even without a euphoric meaning, light is still manipulated to heighten awareness and alter perception. This manipulation occurs through intensity, contrast (sharp or blurred), color shifts, and temperature allowing the users to experience and emotional change. Thus, light becomes something of an experience, going further than allowing someone to see, but allowing them to feel its presence.

CHAPTER V

Light in Nature

Light found within nature can be both harsh or a welcomed, much needed resource. For example, in a desert setting, one might seek shade and protection, versus the more temperate climate where light is needed for warmth. Human and plant species have adapted themselves to the way light is given, knowing when to embrace the presence of the sun. Light within a natural context is appreciated for its simplicity, enhancing earth's natural architectural forms. Through its extremes, light conveys similar properties that connect humans to the same heightened awareness and perceptual shifts found within the man-made architecture discussed previously.

Glen Canyon Gorge

Red sandstone formations throughout Utah create the Glen Canyon along the Colorado River. Over the course of thousands of years the river gradually sliced its way through this sandstone creating layers and depth, carving caverns within its framework (figure 40). This natural undulating form allows light and shadow to play key roles in the experience of the space. The formations allow for cast shadows and materiality to be expressed due to light's angle of inclination. Each curve is recognized due the rolling light along the surfaces. The sheltered areas provide a sense of safety to those who travel through (figures 41 and 42).

Figure 40: view upriver from Kane Creek, 1954 (http://www.glencanyon.org/photos/beforelp.php)

Figure 41: Glenn Canyon Gorge (http://www.glencanyon.org/photos/beforelp.php)

Figure 42: View up Labyrinth Canyon (http://www.glencanyon.org/photos/beforelp.php)

Katie Lee, an environmentalist who hiked the canyon many times throughout her life describes her time within:

> "My trips through Glen Canyon and the river that ran through it changed my life- gave me an understanding of myself, my talent and its limitations; taught me about intimacy and the value of observation. Together they resurrected my spirit and melted my heart with their beauty; showed me time was not my enemy, and with their power to entertain, mystify, and nearly kill me, diluted my ego to its proper consistency. For all my wandering the Glen gave me roots as tenacious as the willows along its banks."
> -Katie Lee (http://www.glencanyon.org/katielee/aboutkatielee.php)

Katie Lee, inspired by the canyon's innate beauty and magnificence, describes the way natural architecture brought her spirit and emotion back to nature. The silt banks were described as "a rainbow of colors – red, light grey, black, coral, blue, yellow, soft green, and brown…[They resemble a] living, opaque, turquoise jewel…[Making an onlooker feel as though they are] looking on something sacred" (Lee, 9). Katie Lee professes in one of her journal entries that it is the river that "heals [her] soul and teaches real love – the one that never died, or been replaced" (Lee, 12), using nature as her God. Figure 43 illustrates the way light corresponds to temperature, where within a desert atmosphere the coolness of a cave is a welcomed attribute against the harsh heat radiating from the ground. Water, a constant transformative matter, is a key element in the varying perceptions of this space. Because of the way it is lit it contains "powers of reflection, spatial reversal, refraction, and the transformation…" (Holl, 80) (figure 43). Light that makes its way through the cracks from the surface above, illuminates the floor and empty space ahead, directing the flow as people make their way through the canyon (figure 44). It is through the periodic glimpses of

the sky through the rock that one can be aware of their surroundings while feeling sheltered.

Light within a natural context connects people to their inner self. It brings about awareness in the most simplistic form. Lights manipulation comes from the way in which it passes through the vegetation, or the way it is perceived through the changing seasons. It occurs through intensity, contrast (sharp or blurred), color shifts, and temperature, each allowing humans to experience an emotion change. Even though there is no direct application that alters light within nature it conveys similar properties that connect humans to the same heightened awareness and perceptual shifts found within man-made structures.

Figure 43: Backwater at mouth of Dungeon Canyon (www.glencanyon.org)

Figure 44: View up Dungeon Canyon (www.glencanyon.org)

CHAPTER VI

Precedent/Thesis Connection

Each of these precedents demonstrates how architecture can create a heightened awareness and emotional shift based on the characteristics of light. With an objective of emphasizing the sensual and tactile experience of architecture, the architect can manipulate light with an awareness of its affects. Each precedent dealt with the quality of ephemeral light, addressing it by different means, by the solids and voids, opacities, transparencies, and translucencies, changing how one perceived and interacted with the space. St. Ignatius chapel used light to direct focus to its “seven bottles of light,” creating an experience for its users. Church of Light used light as a sharp contrast to the dark space, creating an internal spiritual awareness for its users. The Thermal Baths used light as a means to guide flow and create serenity for its users. The forms of Glen Canyon Gorge are highlighted by light, where the texture and color come alive as the light changes with time and season. These structures refer not only to the science of light, but rather to the emotions evoked within. They produce the properties and qualities of light such that the architecture can continually transform the individual’s connection based on the specific light characteristics of that day; creating meaning for the individual and the architecture.

Equating wine to light, the process of making the wine engages all the senses. Wine is even used in Catholic rituals, where the offering of communion, for example, “engages the senses and the spirit…” in the same

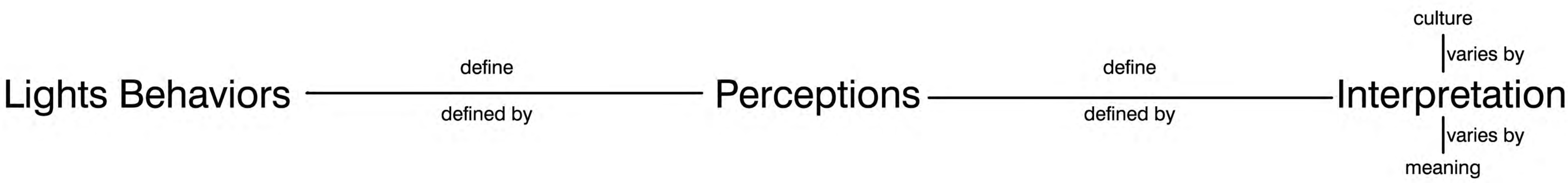
respect light does (Pearson, 241). Given the architecture that has recently been devoted to wineries, these wineries now provide a place of tourism while establishing identity. Wineries have become destinations for everything from a night of wine tasting, to a weekend getaway and even to weddings. Establishing a place, where the community and tourists alike join in the learning processes of wine making. It relates directly to the history of the site, in that is provides a source of income for the Knoxville area, just as the stone once did. The winery relates to this thesis in how the light is used to heighten awareness and alter perception for all of its users, both workers and visitors. These issues all help establish the sense of place, they are aesthetic. Light plays a key role in this design literally, in helping grow the grapes and keeping light out of areas of storage, and perceptually by controlling the worker and visitors attitudes. Light helps the vineyard workers; who have the task of training the vines, pruning, and harvesting the grapes while they are in their peak, the owner; who watches over all the workers, controls the financing, production, and marketing of the vineyard and winery, the cellar manager; who watches over all the wines delegating the taste of certain wines, deciding on what herbs to add, and controlling the bacteria, and the visitor; who come to escape from the city life, either to enjoy the serenity of nature while tasting wine, or to engage in a dinner with friends.

The initial design began through an understanding of lights behaviors, how they begin to define people's perceptions, and how that begins to define people's interpretations (which varied by meaning and culture). After which, a thorough understanding of the users of this space was established, becoming familiar with

the various levels of experiences and their individual states of awareness (figure 45). After the understanding of the individual's states of awareness, a timeline illustrating the daily and seasonal patterns of movement informs where the focus of light engages the program (figure 46).

With attention to seasonal variations, figure 47 illustrates the vineyard in mid-October, just before harvesting season. The lush vegetation provides a dappling of the light as it filtrates the grape vines. Within the winter months, the grape fines would become bare, allowing the maximum amount of sun to penetrate the vineyard and warm the workers as they prune, train, and fertilize the area.

The existing structures on site provide spaces for the workers to escape the harsh sun, store equipment, and gather with co-workers. The light is brought in to highlight the existing stone walls, to showcase their tactility and form. Each space was laid within the confinements of the stone walls, only to penetrate in moments where a heightened awareness takes place (figure 48).



owner
the owner of the winery has the tasks of making the rounds everyday. maintaining contacts such that the wines produced can be manufactured to the necessary clients. this ensures the stability of the vineyard and the workers income.

vineyard manager
the vineyard manager is in charge of all of the vineyard workers. he must carefully watch the grape vines to control the water and sunlight such that the grapes go without disease. he must prioritize the daily tasks to lead in the necessary projects. because the responsibility of the workers and the grapes rests within this person, a space for private rest and rejuvenation is imperative.

vineyard worker
for the non-temporary worker, the vineyard worker has the daunting tasks of pruning and training the vines throughout the year regardless of the weather. they must be aware of the diseases that can inhibit the growth of the grapes. they must fertilize throughout the year and re-plant as necessary. each task varies throughout the season, december and february being the least busy, but during harvest season, in september the permanent workers, roughly 4 of them, are accompanied by 60-70 temporary workers to help pick the grapes. each season presents it own tiring daily routine, a space for revitalization is necessary.

winery manager
the winery manager must be aware of all things going on in the process of making the wine. she must be careful in examining the wines as they pass through each process, constantly checking for bacteria and evaluating the taste. assessing which herbs need to be added at various stages. she needs a space that addresses full concentration and focus. taking her awareness off of the light, allowing the senses of taste and smell to take over.

winery worker
the winery worker must be focused and driven throughout the day. prioritizing their tastes such that the necessary projects get done on time. they must stay aware of all things going on within the winery, focusing on when grapes come in during harvesting season and consistently checking the fermentation tanks and oak barrels for bacteria. these workers must have a space for refuge. allowing them to leave the noise and smells that inhabit the winery space.

visitor
the visitor comes to release their tensions, to break from the hustle of the city, allowing the sensual and tactile experiences to reinforce one another. the visitor interacts with the spaces, allowing all senses to be engaged. the interaction of the visitor and the worker is a play on emotions, when they are revealed to one another and when they remain hidden. the refuge space of the visitor lies within tasting the wine and interacting with nature, reminiscent of the botanical gardens.

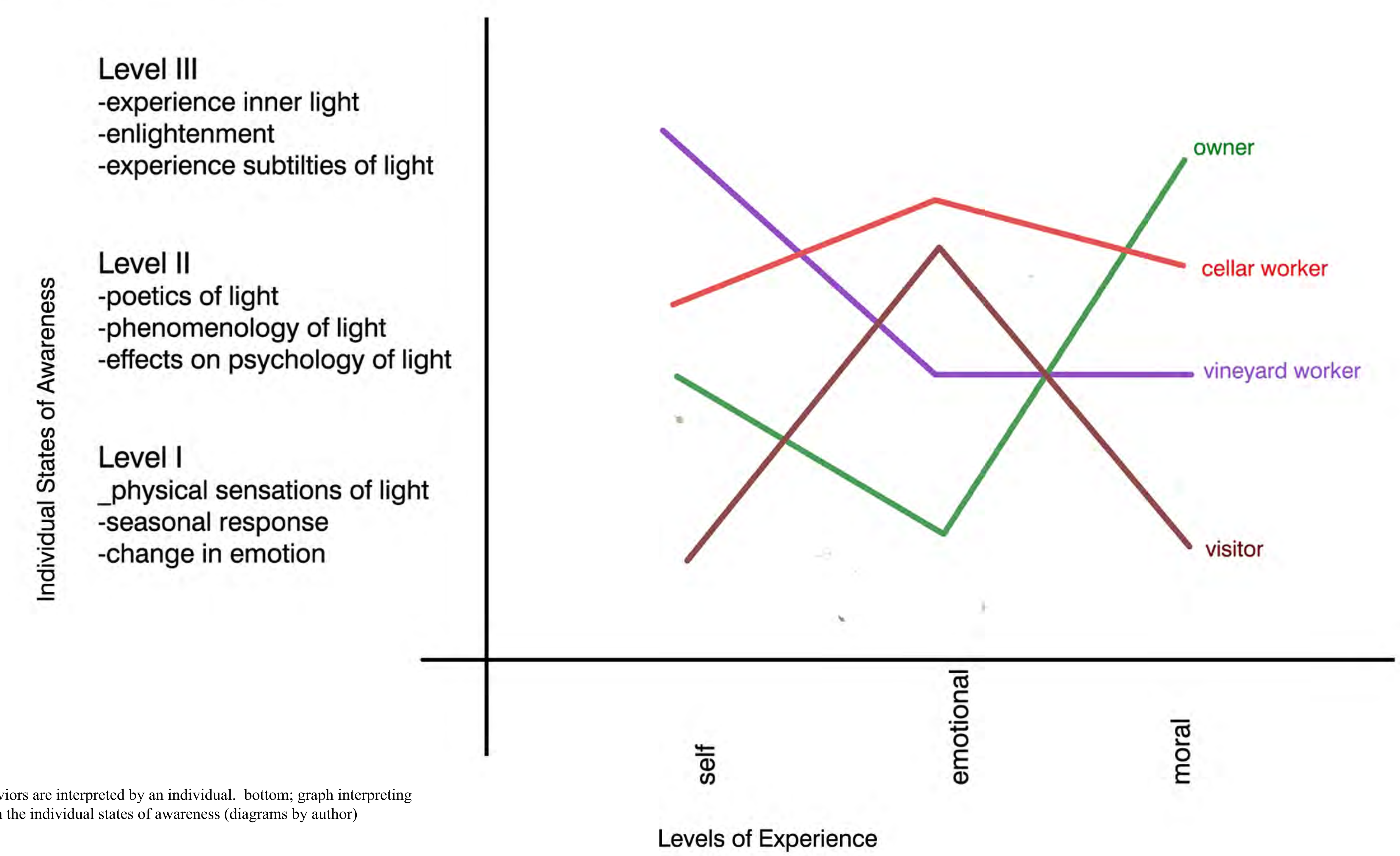
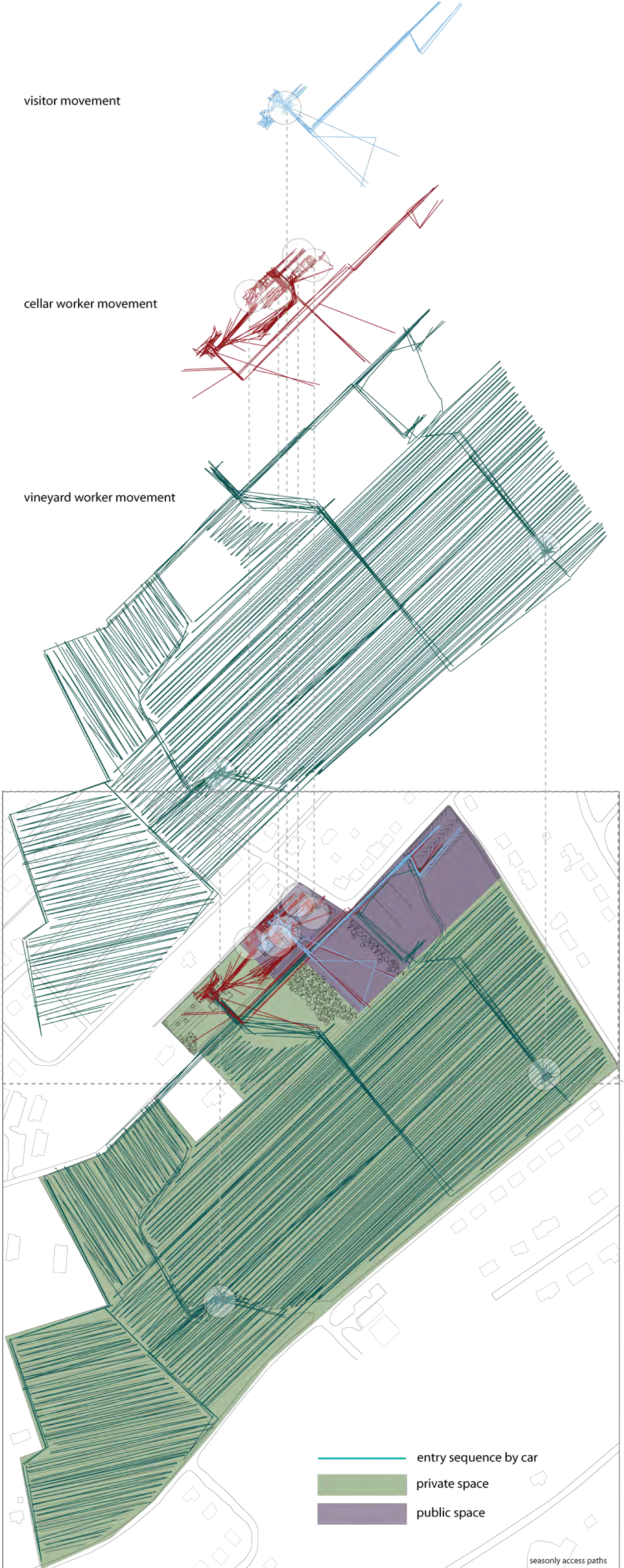
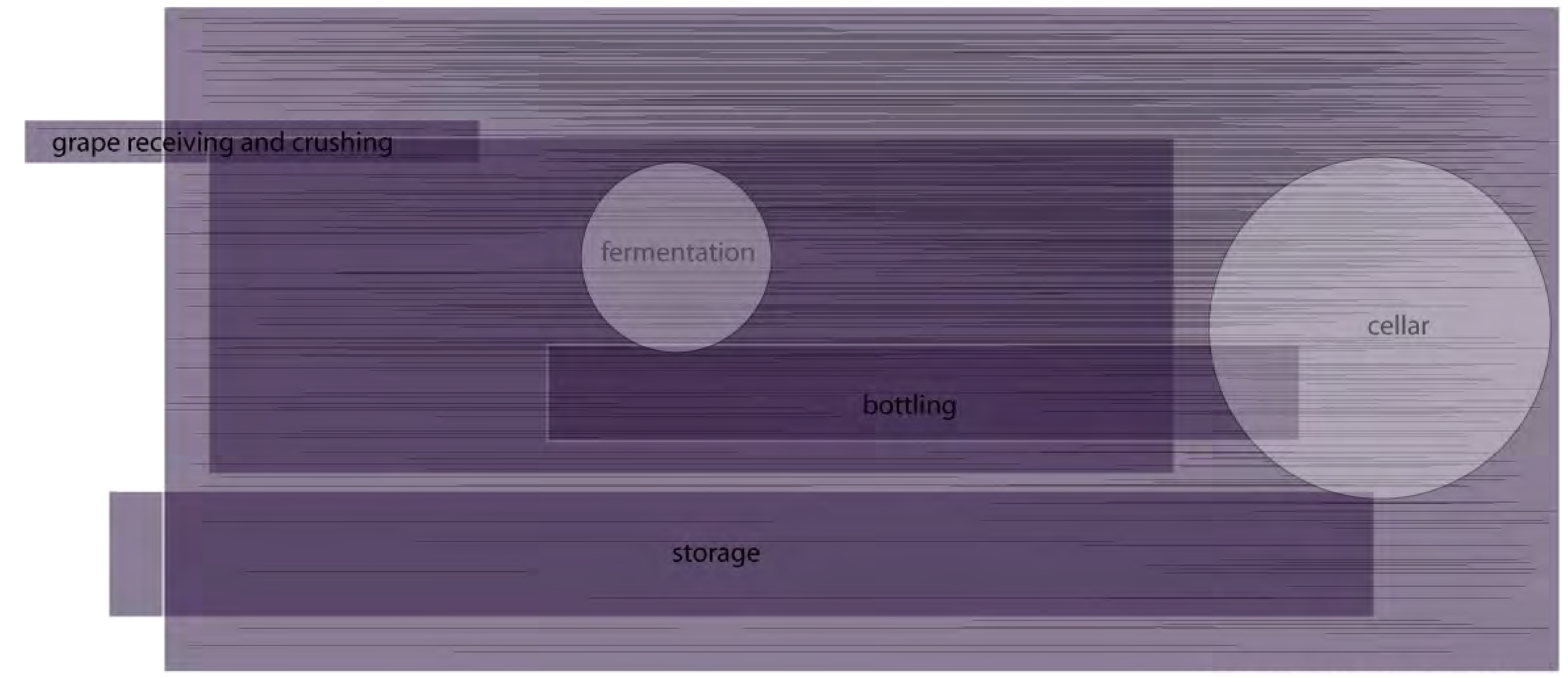


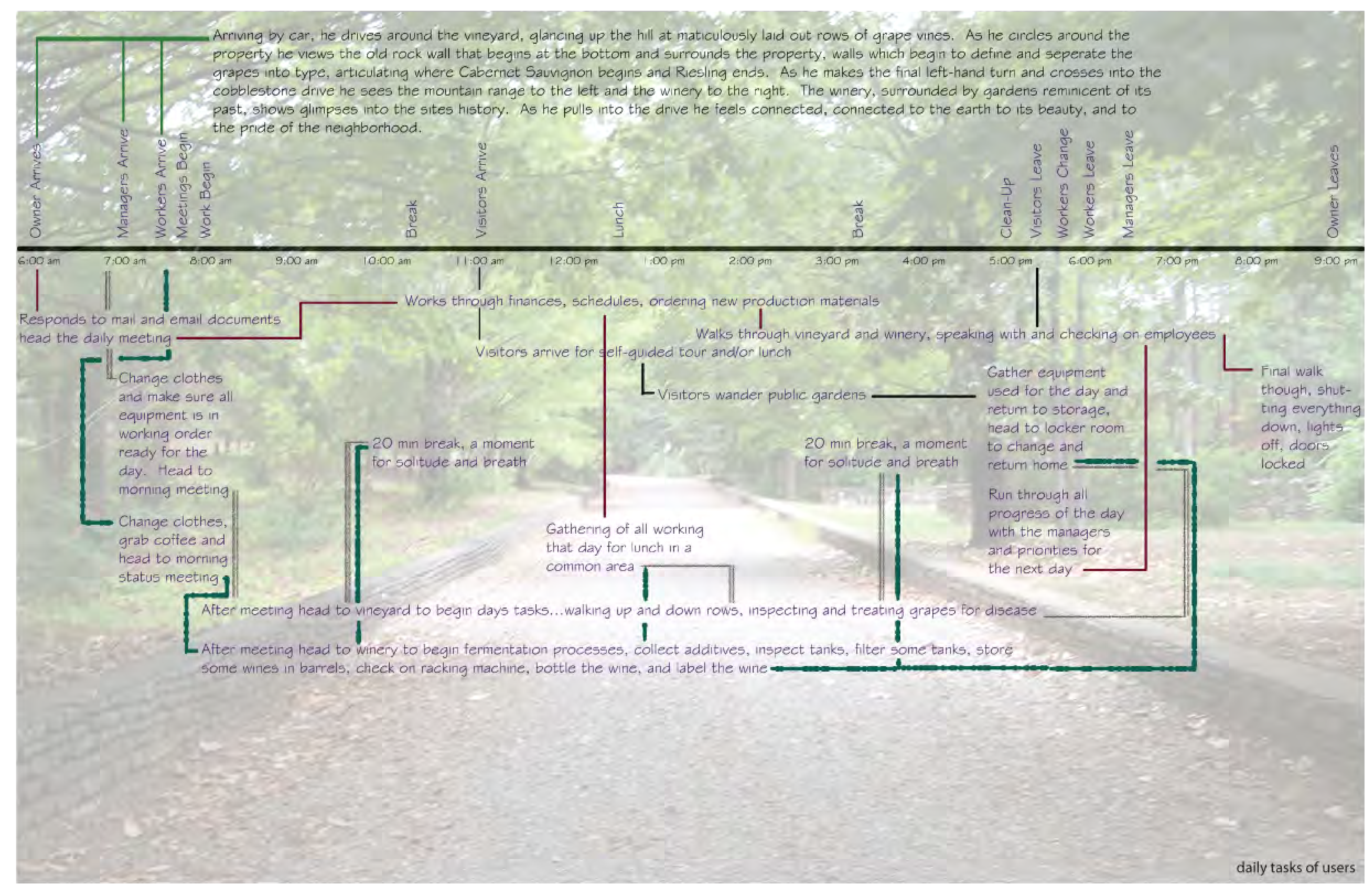
Figure 45: top; diagram of how lights behaviors are interpreted by an individual. bottom; graph interpreting how the levels of experiences coincide with the individual states of awareness (diagrams by author)



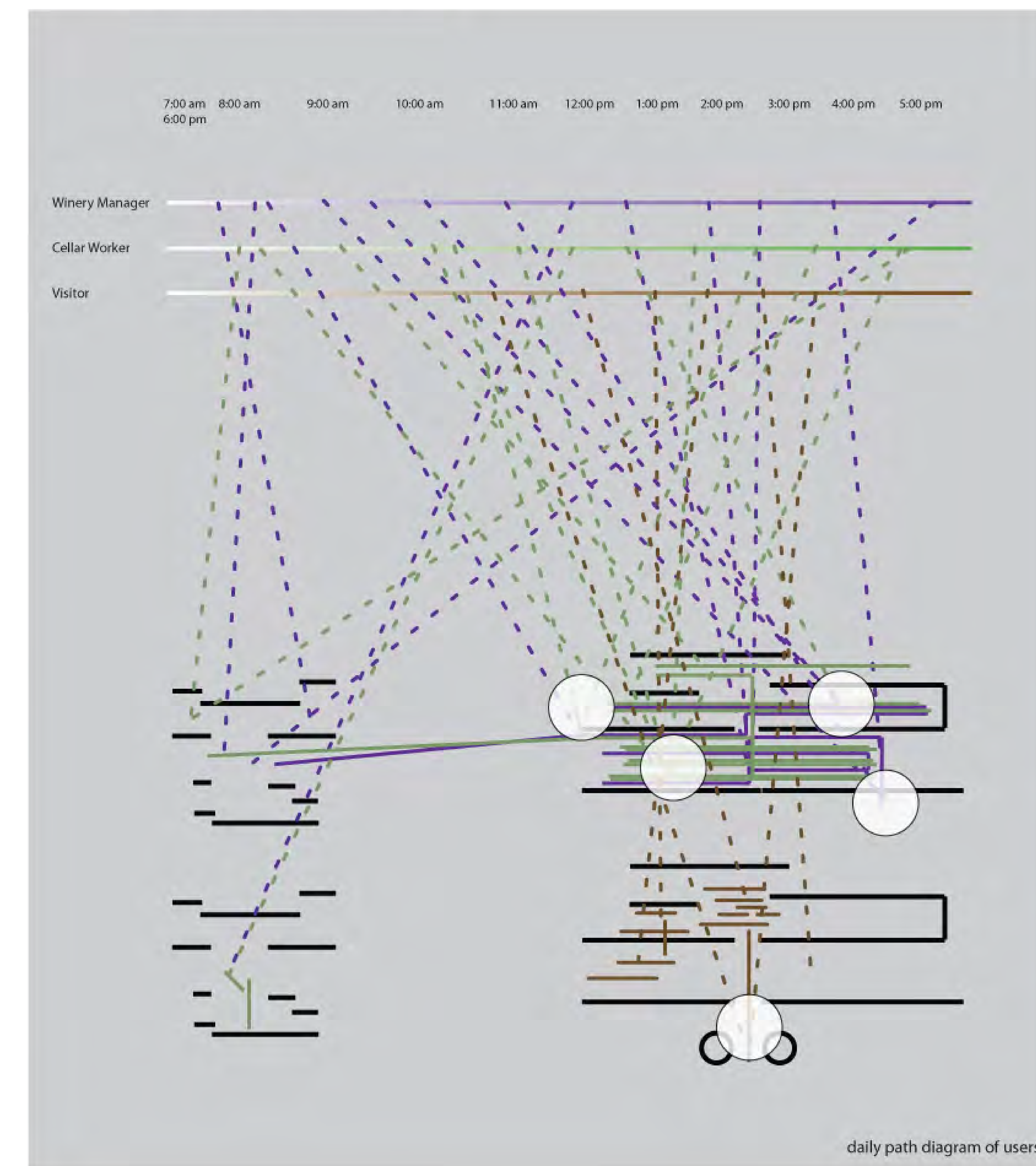
seasonly access paths



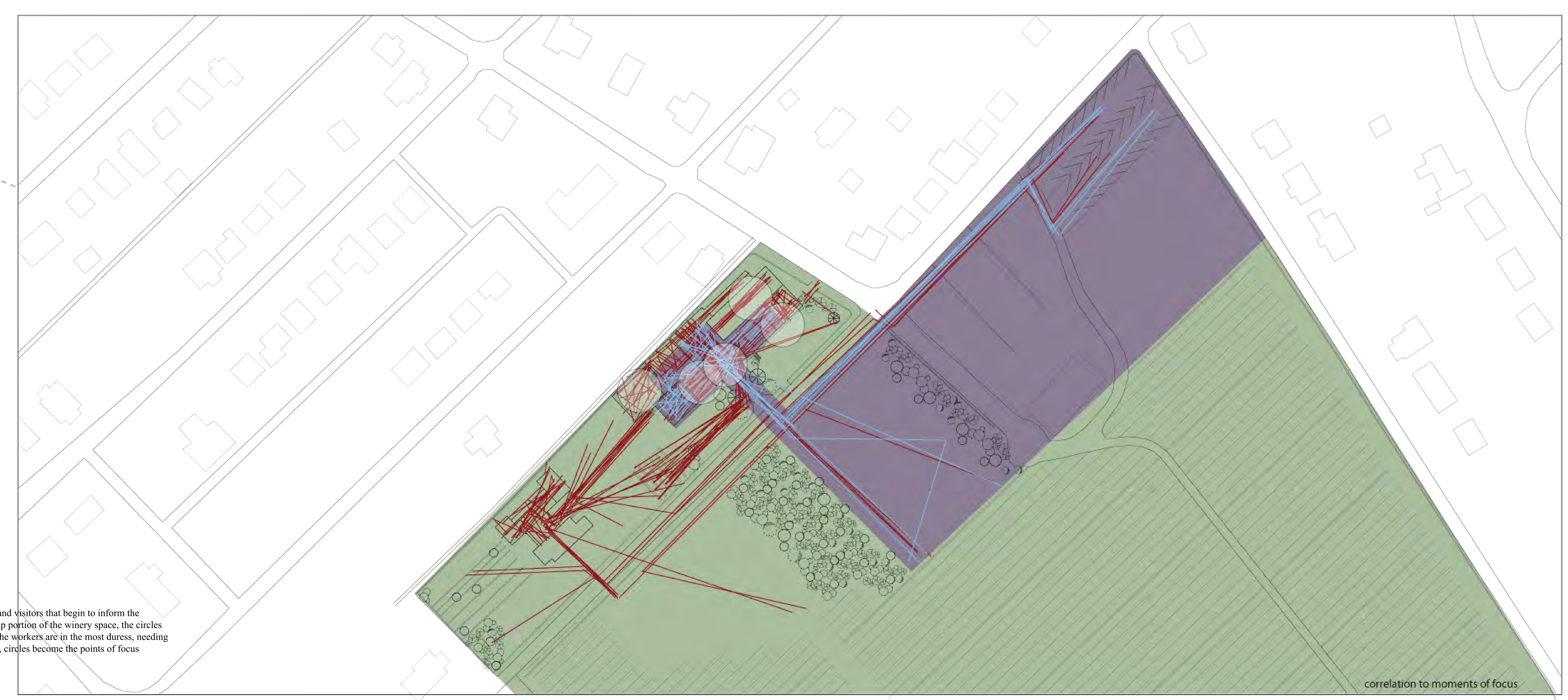
wine making process with moments of duress



daily tasks of users



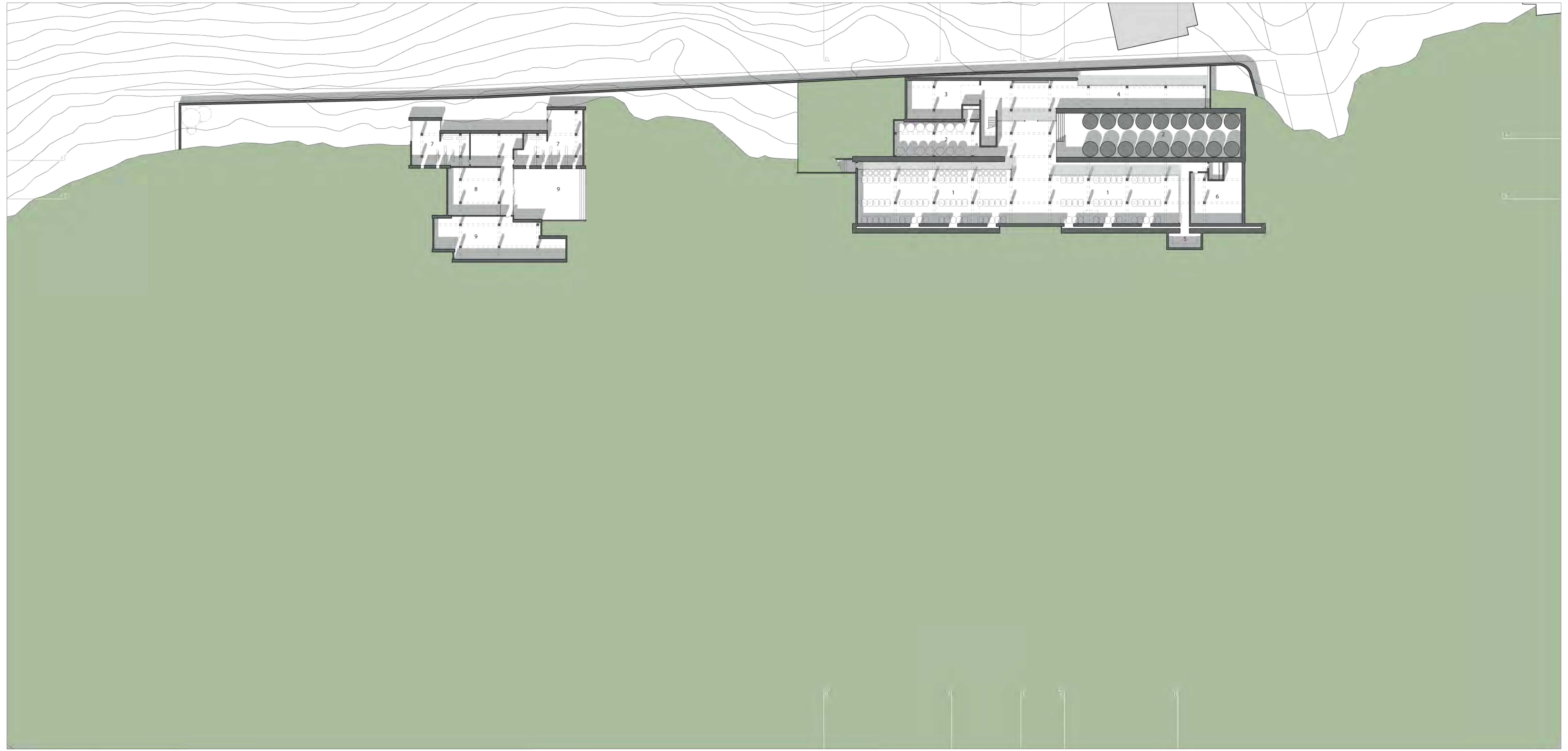
daily path diagram of users



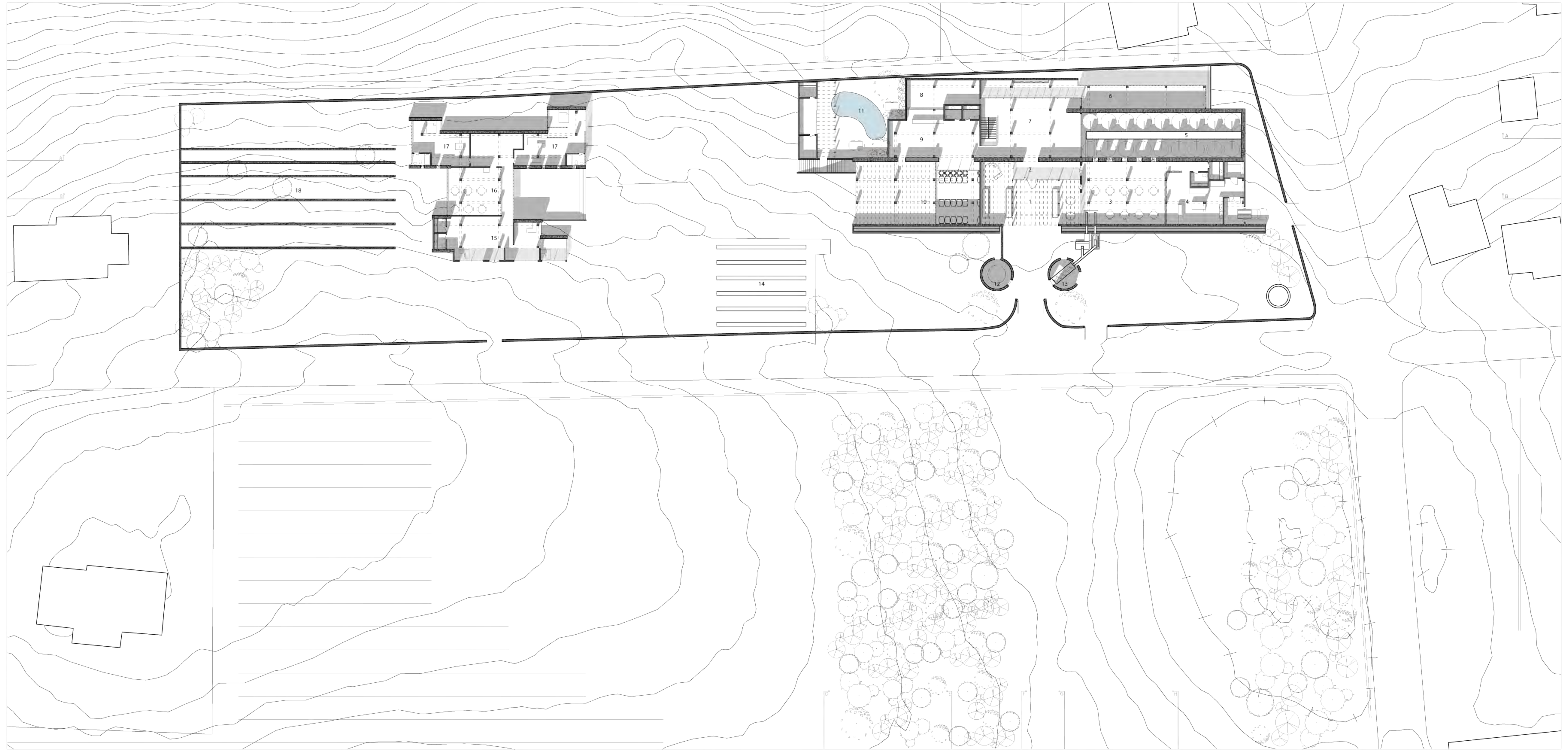
correlation to moments of focus

Figure 46: left; annual pattern movements of vineyard workers, winery workers, and visitors that begin to inform the programmatic spaces of which the light becomes the focus. bottom right; blown up portion of the winery space, the circles are the spaces of focus. upper right; diagram of wine-making process and where the workers are in the most duress, needing the most focus. middle right; daily timeline of workers and patterns of movement, circles become the points of focus (diagrams by author)

Figure 47: vineyard, winery illustrated as mid-october, just before harvesting season



1. Cellar
2. Fermentation Rooms
3. Bottle Storage
4. Bottling Room
5. Winery Managers Office
6. Mechanical / Storage
7. Locker Rooms
8. Meeting Room
9. Storage Room



1. Courtyard
2. Entry
3. Restaurant
4. Kitchen
5. Fermentation Walkway (open to below)
6. Bottling (open to below)
7. Viewing Platform
8. Wine Store
9. Wine Tasting Room
10. Courtyard
11. Garden
12. Herb Drying Room
13. Grape Crushing Room
14. Herb Garden
15. Office Space
16. Employee Kitchen
17. Studio Apartment
18. Amphitheater

Figure 48: left; cellar floor plan. right; upper floor plan. shadows are illustrated as 2:00pm in July (by author)

Because the stone walls remain, at maximum, twelve feet high, the underpinning is a smooth finish concrete. This allows the rough texture of the stone to gain the maximum contrast, allowing it to take focus. The sections cut through the structure illustrate the manipulation of light as it enters the space (figure 49-54).

By narrowing the focus of attention on light to a few, specific spaces, these spaces become moments. The moments, in turn, heighten the awareness of its users while altering their emotion (figure 50-54). Using the existing entry to guide the users into the space the vegetation provides the first dappling of the light. Upon entering the courtyard the visitor becomes immediately connected with the wine as the herbs are used are placed in planters which they must past by. Visitors can visually see bottles of wine as they peer through the space to the back wall of the structure, connecting the user from one end of the process to the other. After passing through the first stone wall, the second is highlighted with the manipulation of light, allowing light to only graze it within a certain time frame (figure 55). After passing through the wall, the visitor enters the viewing platform where the process of winemaking can be observed. Only when they enter into the tasting room do they again cross through an existing wall. The light which highlights this wall is to the visitors back. This allows the focus to remain on the wine.

The cellar workers, who have the task of making the wine, primarily focus on the fermentation tanks and the cellar space. These parts of the process must remain heavily checked such that bacteria and disease does not infect the wine. The winery manager has the daily task of checking the acidity levels, sugar

levels, and SO_2 levels of the wine that has been aging. She passes underneath the existing wall structure, through the beam of light, where her focus is on the science of wine rather than the light. The workers themselves have a private garden space, where they can take a break to revitalize.

The form and materiality of the structure was built around the manipulation of light. By focusing in on specific moments the users become more aware of their surroundings and thus, their emotions.

Figure 49: longitudinal sections demonstrating the manipulation of light. Shadows are illustrated as 1:00pm in July (by author)

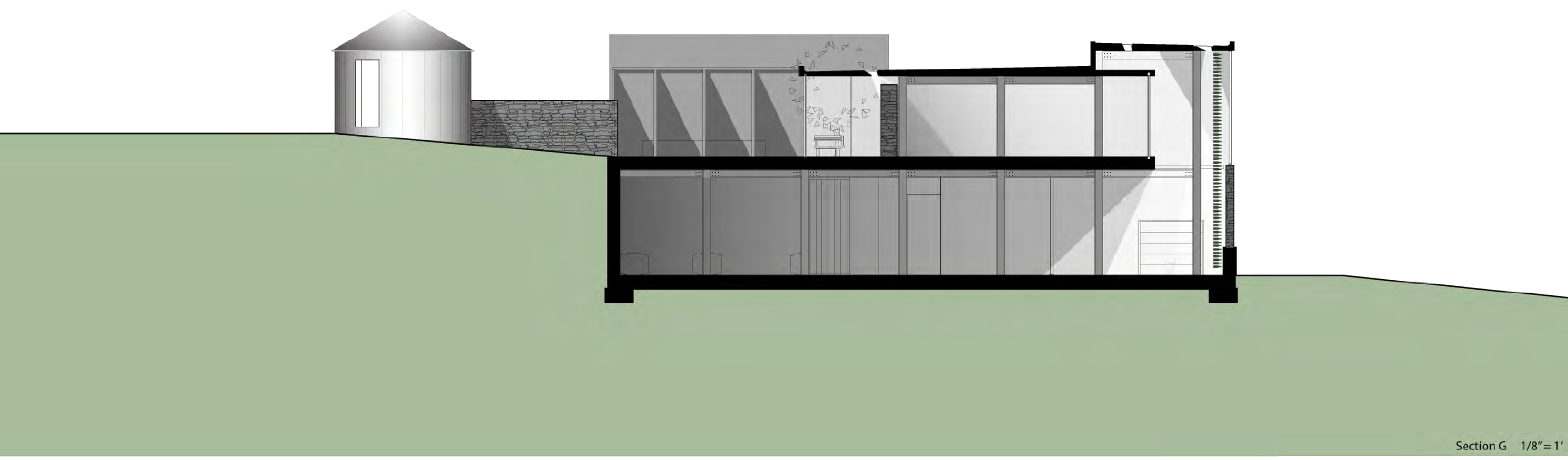
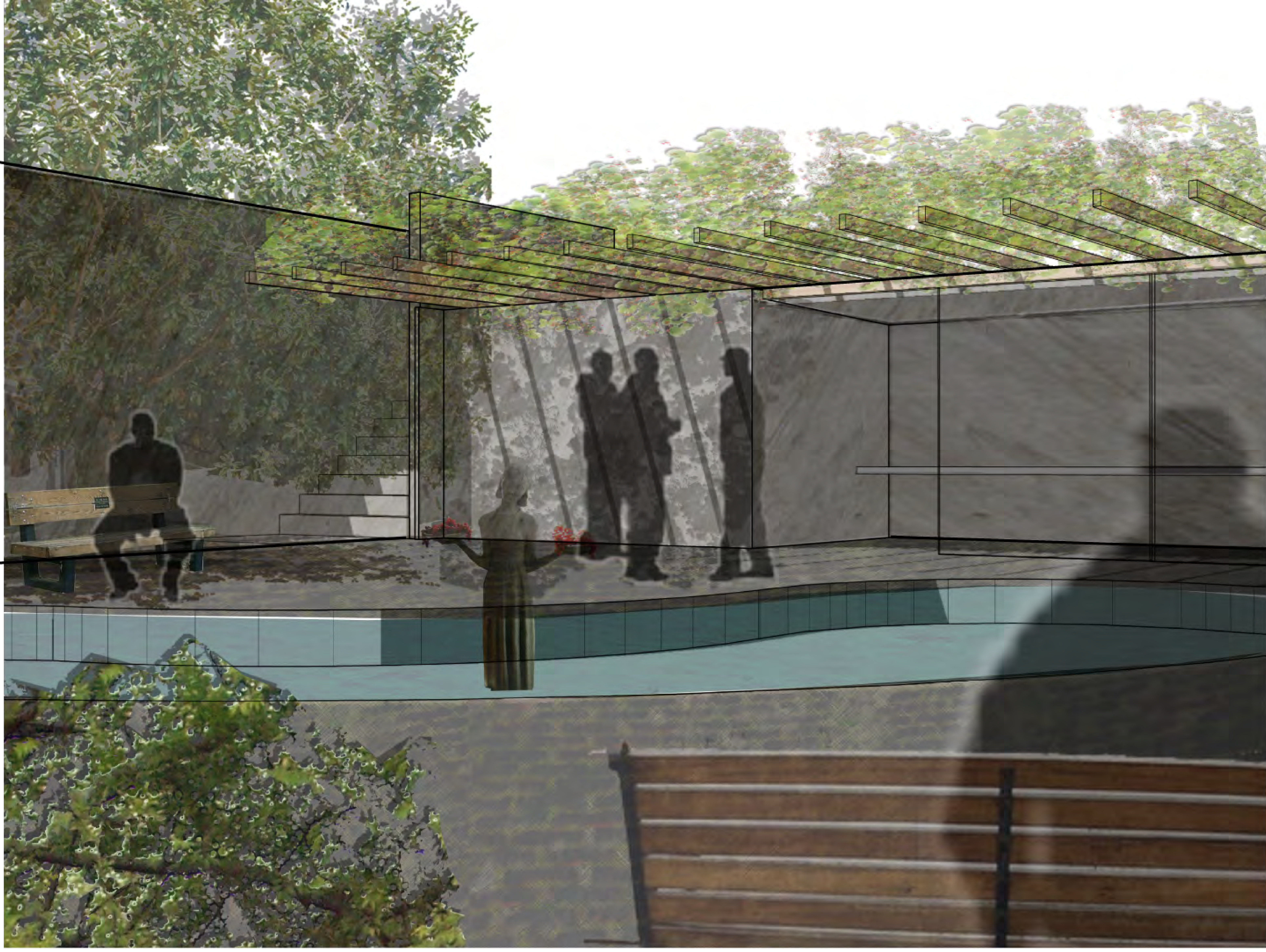
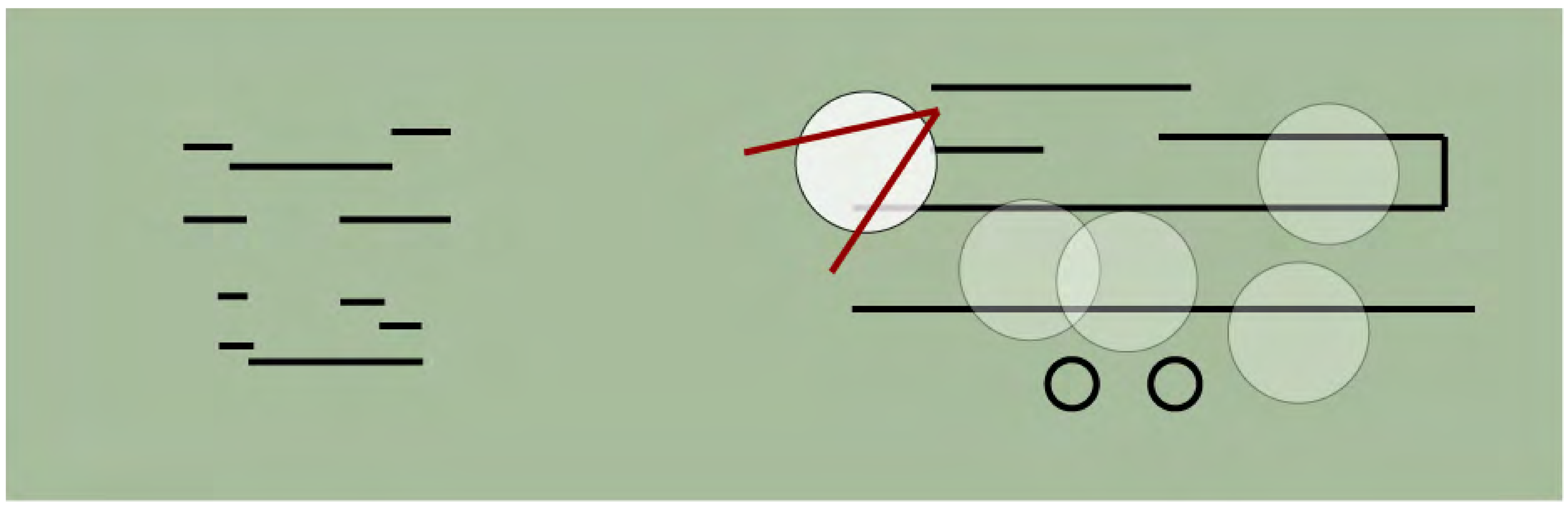


Figure 50: above; entry perspective illustrated at 10:30am in September. below; section G showing manipulation of light illustrated at 1:00 pm in July (each by author)

Figure 51: above; perspective in fermentation room showing a worker on the walkway facing viewing platform illustrating shadow at 3:00pm in September. below; section H showing the manipulation of light at 1:00pm in May (each by author)





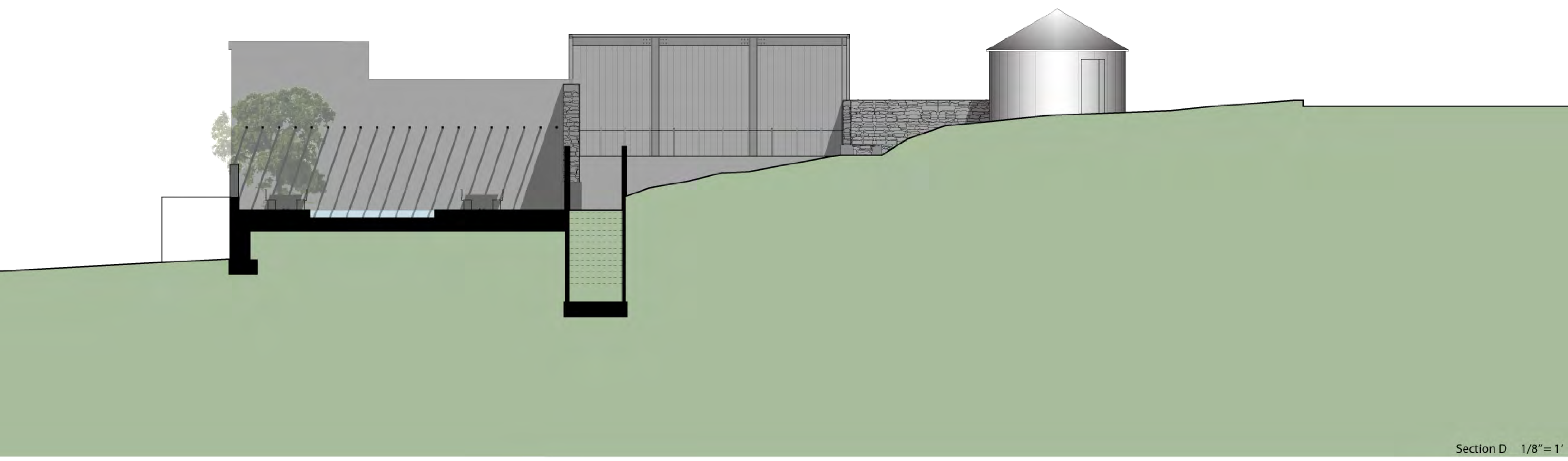
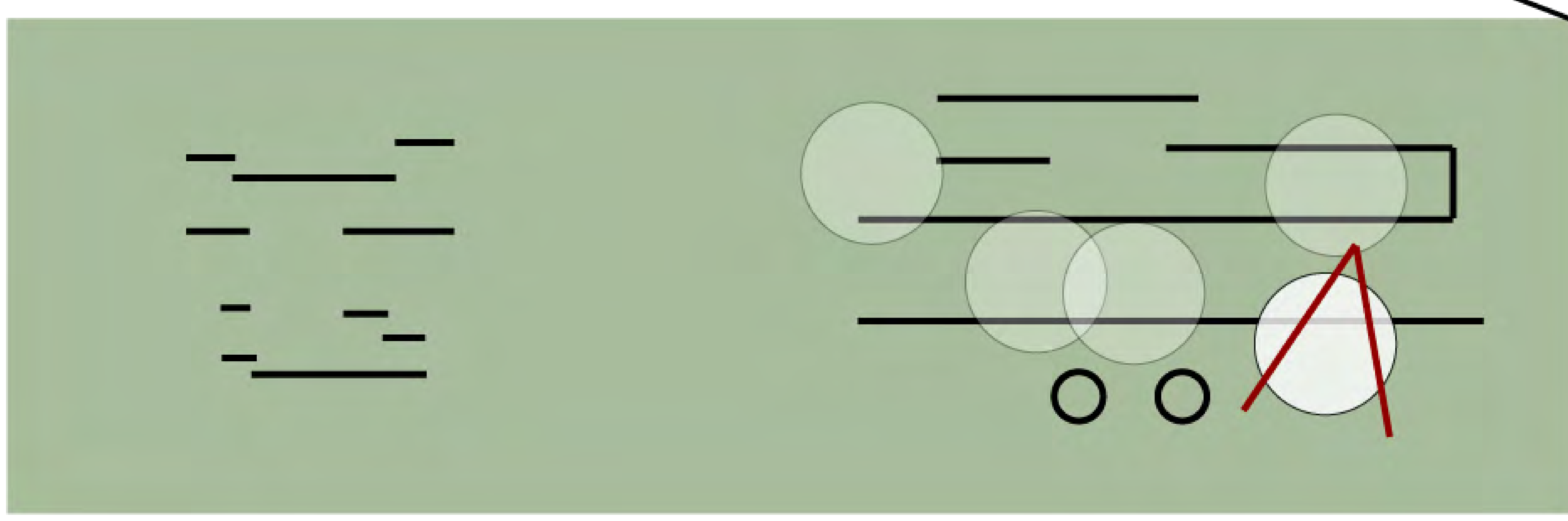


Figure 52: above: perspective at private garden space, mid-July vegetation, overlooking water and outdoor kitchen illustrating 4:00pm shadow in July. below; section D showing the filtration of light at 4:00pm in July (each by author)



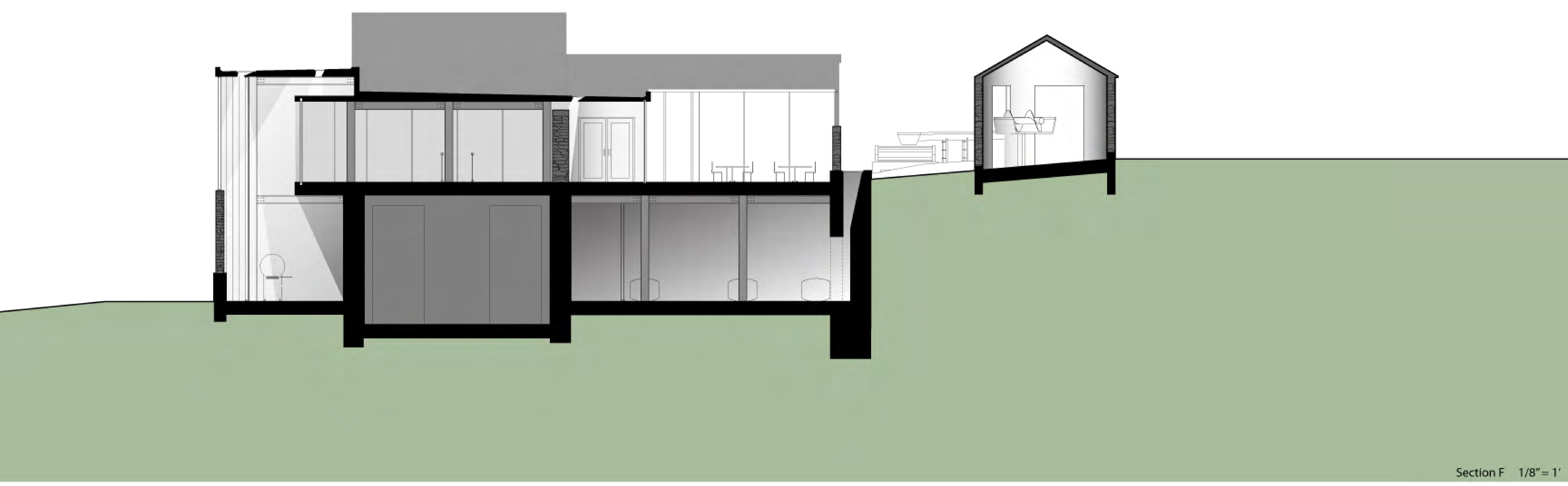
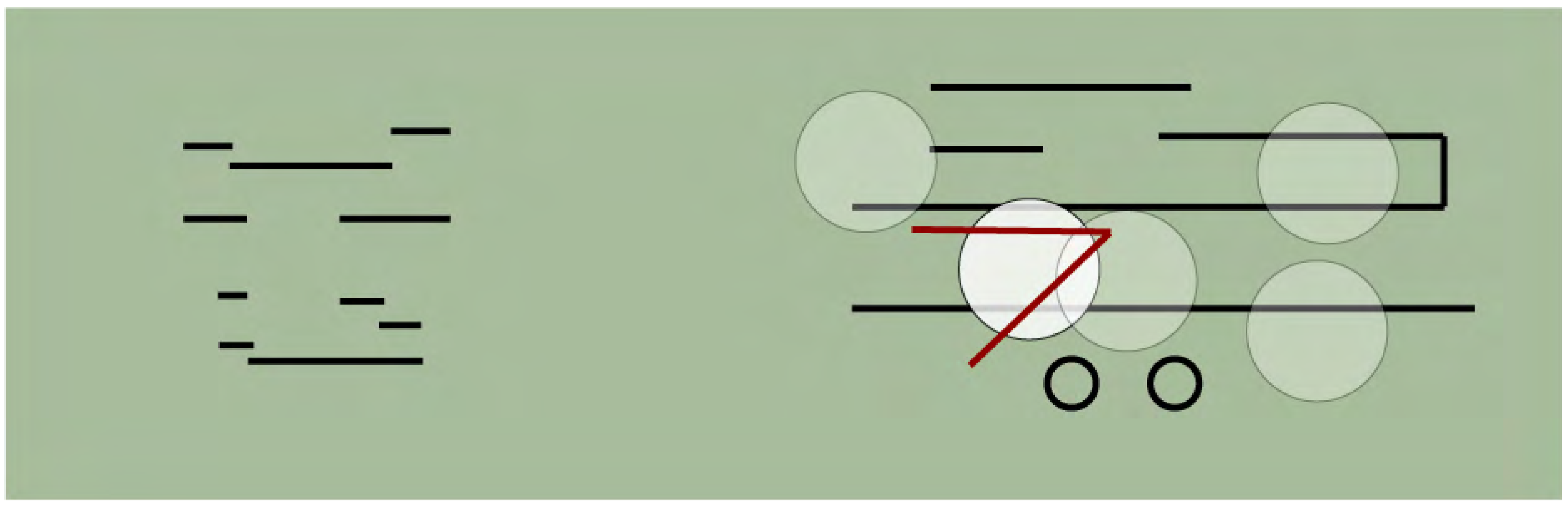


Figure 53: above; perspective of winery managers office illustrated at 4:00pm in June. below; section F showing the manipulation of light at 11:00am in June (each by author)



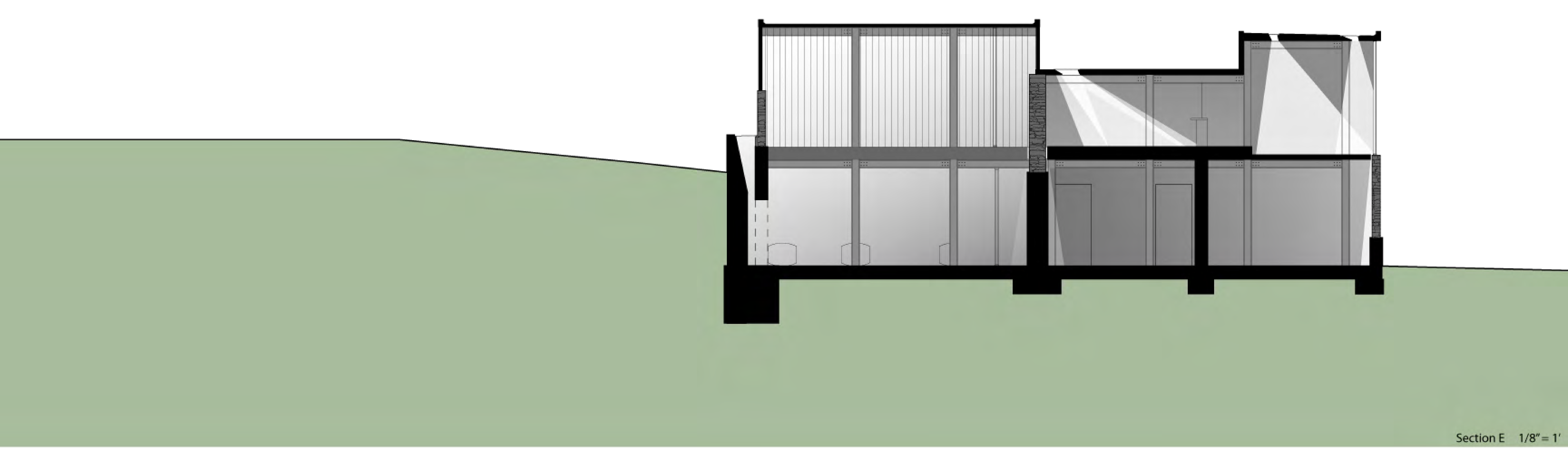


Figure 54: above; perspective of cellar space illustrated at 10:00am with artificial lighting. Below; section E showing the manipulation of light at 3:00pm in October (each by author)

Entry Perspective 9:30 am in September

Entry Perspective 10:30 am in September

Entry Perspective 11:30 am in September

Entry Perspective 12:30 pm in September

Entry Perspective 1:30 pm in September

Entry Perspective 2:30 pm in September

Figure 55: 30 minute time increments of the entry during harvesting season, illustrating the shadow across the rock wall within the courtyard

CHAPTER VII

Site Analysis

The Knoxville Botanical Gardens is claimed to be the “secret garden” of East Knoxville. The existing stone walls and structures on site, the ample vegetation, and the southern facing slope, provides many opportunities for the manipulation of light. Just miles from a dense urban setting, the Knoxville Botanical Gardens holds the feeling of relief, providing a garden oasis for its neighbors (figure 56). Its history, however, ties into the whole city of Knoxville.

East Knoxville is comprised of mainly single family homes (generally low income) with a few old plantation mansions and pockets of multi-family housing complexes. The residents within the area remain prideful, hoping to revitalize the area. The site, as a winery and vineyard can serve to bring an economic source to the neighborhood and a new identity. Its history has the spirit of its predecessors giving a heightened sense of spirituality or connection to those that inhabit the space today.

With an increase in interest of aesthetic plants among the area in 1815, the garden served as a nursery for the neighborhood. In conjunction with the implement of the railroad in 1855, the nursery became a growing economic source as it not only provided vegetation, but also a variety of stone for Knoxville and the areas served by the railroad. This stone, which is the primary material of the structures on site including the property wall, consists of Crab Orchard, stone from the Lambert Quarry in South Knoxville, stone from the English mountain, stone from Kentucky and stone from a few other surrounding areas.

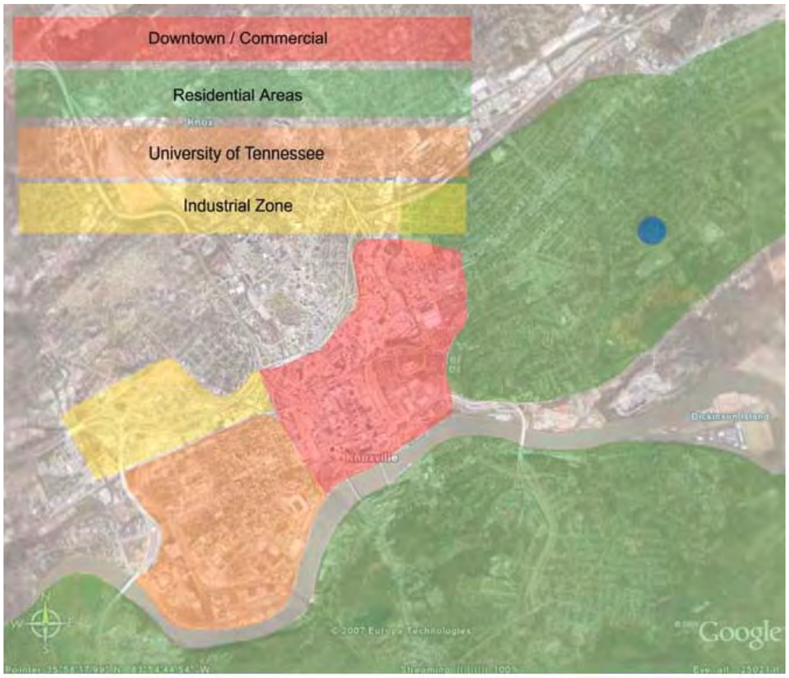


Figure 56: context diagram to Botanical Gardens [in blue] (by author)

The Knoxville Botanical Gardens contain several existing stone walls, structures, and trees that date back hundreds of years. Diverse senses are activated through the deciduous trees lining the property and the various textures along the bed of the floor. The trees filter light along the bed of the garden, enhancing the space such that no two occurrences are alike; the wood chip path gives off the scent of wood; the breeze, as it blows through the canopy of the trees, enhances the sound of the space through the rustling of the leaves; and the various textures call out to be touched.

Within the higher vegetation areas on the lot perceptual qualities directly relating to light contain a more ephemeral feel than the more open areas. The difference in the experience of the space is sharply different from season to season (figure 57 and 58).

Figure 57: Existing entry to Knoxville Botanical Garden, early September (photo by author)

Figure 58: Existing Entry to Knoxville Botanical Gardens, mid November (photo by author)

Today, a pathway is formed by the sites offset trees, bending rock wall, and existing circular shed spaces that serve as the entry pillars to the gardens (figure 59). Framing the landscape, the door within the stone wall (located in the background of figure 59) directs the occupant through the space keeping them on axis to the entry. Once on the other side the view is constricted, framing the space from which you just came (figure 60).

Figure 60 demonstrates a framed view within an opaque wall where light plays off the natural form of the stone showcasing all of its imperfections. The tree canopy serves as a translucent and transparent window toward the sky. Depending on the available daylight, light pierces this irregular window illuminating the floor and feeding the plants. A local material, the stone becomes a part of the landscape and connects itself to history while defining space. Using these existing stone walls and the essence of light within the previously defined spaces to enhance the program the individual spaces that heighten awareness and alter perception can be brought out.

Figure 59: panoramic of entry gate with bending rock wall (photo by author)


Figure 60: view looking back toward entry from within the garden space (by author)

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APPENDIX

APPENDIX A

Site Analysis

Surrounding Site Context and History

The site itself is buried within a residential area, its closest proximities include the downtown area and the University of Tennessee (figure 61). The Tennessee River runs south of the area while Interstate 40 runs to the North. Each of these areas consists of large corporate businesses and smaller local commercial stores. The university provides for an economic source for the city. The site is disconnected to the downtown Knoxville area situating itself between an interstate and a major highway. Its connection lies in its accessibility to the street. The KAT bus system does not travel directly to the site, but it does come within a couple of blocks.

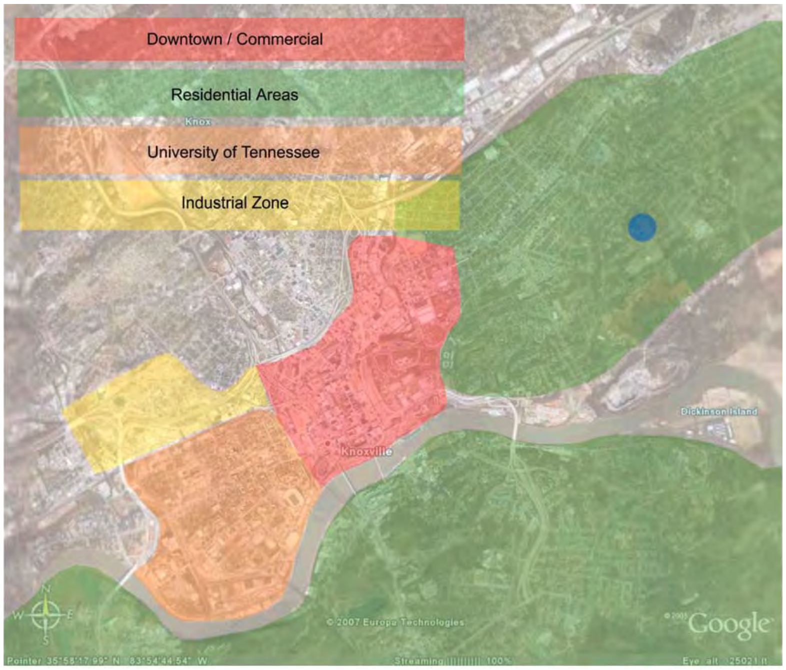

Figure 61: Knoxville Botanical gardens is located within a residential neighborhood, three miles from downtown and the interstate (diagram by author)

The site itself is deeply rooted within a grid of streets that lead to the interstate and/or surrounding areas (figure 62). Knoxville Botanical Gardens consists of 44 acres, divided by Wimpole Ave, to the Northwest, and surrounded by Boyds Bridge Pike, to the southeast, Parish St. to the Northeast, and Houston Street to the North (figure 63).

Beck Cultural Exchange Center is a common ground for learning of the African American tradition throughout Knoxville community. Founded in 1975, the center started when James and Ethel Beck, “prominent members of the Knoxville community and founders of the Ethel Beck Home for the Orphans,” passed away.

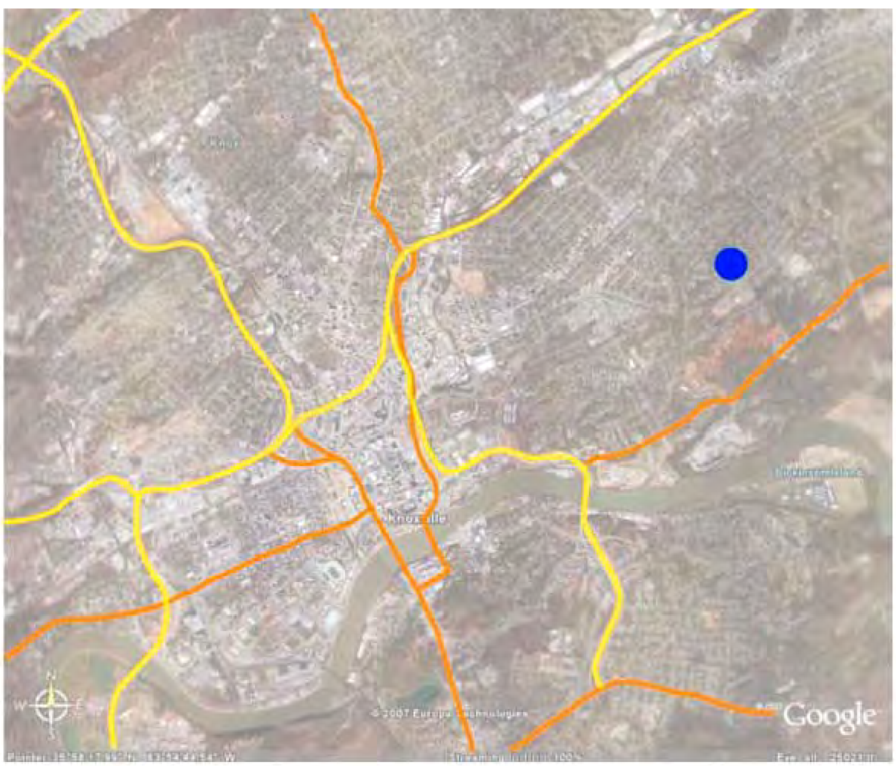

Figure 62: This diagram shows a hierarchy of roads; yellow represents interstates, orange represents highways, blue, the Knoxville botanical gardens sits within the two (diagram by author)

Figure 63: This diagram represents the arterial streets directly surrounding the site (diagram by author)

Morningside Park consists not only of the Alex Haley statue, which is the focal point of Haley-Heritage Square but also play structures and community sheltered spaces. It was designed by the surrounding communities and built by its residents to provide a place for the community (figure 64 and 65). Alex Haley Statue, within Morningside Park, is an interactive statue amongst a children's playground, honoring the author of "Roots." This statue is claimed to be one of the largest celebrations of an African American in the country. Designed by Tina Allen this statue stands 12 feet tall and is cast in concrete, it was dedicated during Black History Month in 1998 (figure 66).

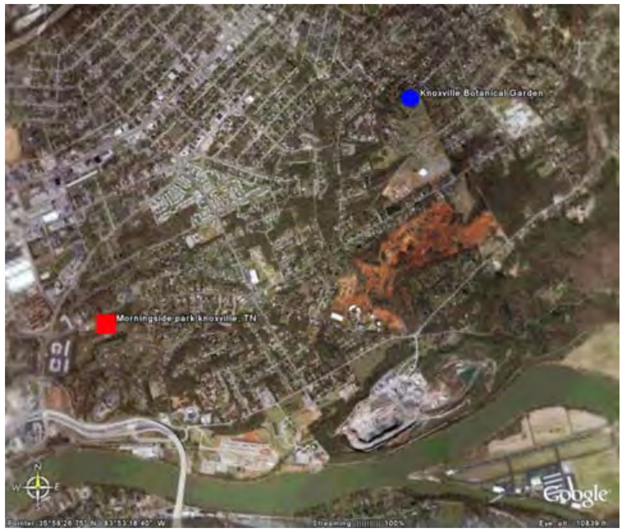

Figure 64: The site lies roughly a mile from the Beck Cultural Center and Morningside Park

Figure 65: Morningside Park map (http://www.ci.knoxville.tn.us/parks/haley.asp)

Figure 66: Alex Haley Statue overlooking Morningside Park

History/Analysis of Botanical Gardens

David Wessels Howell was given a piece of land in 1786, turning it into a plant nursery and orchard that would transcend for generations to become Knoxville's "secret garden." In the early 40's the gardens were originally used as a selling tool. Selling not only the plants that were within but the garden but the stone that was advertised in its property wall, the stone found within East Tennessee.

Divided into two parts, separated by Wimple Avenue, the north end of the property holds the nursery and the existing house which has been converted into an office/meeting space. Each of the existing structures gives a sense of simplicity and symmetry to the site. It also holds green houses, and a "banquet hall" which smells of history and permanence.

The other part of the property, just across Wimpole Avenue is vastly more open than its counterpart allowing for the views to the Smoky Mountains. The top of the hill, just across the existing home slopes south 100' to the bottom of the property. It too has exiting structures, however most are prefabricated metal sheds. Figure, 67 illustrates where the existing structures are within the site, the dark grey color.

As religion is a big part of the South and the history of the South, there are many churches that surround the site (figure 68), each having their own unique way of involving the community. Establishing various points of congregation surrounding the area, encouraging a positive growth and involvement from the residents within the area.

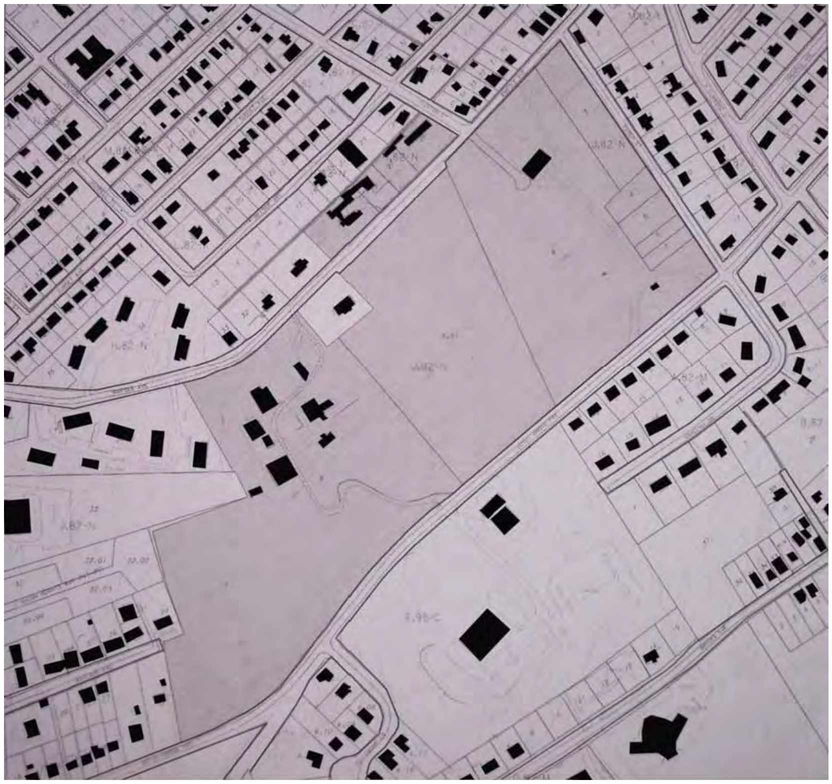

Figure 67: figure ground illustrating the existing structures on the site [dark grey color] (diagram by author)

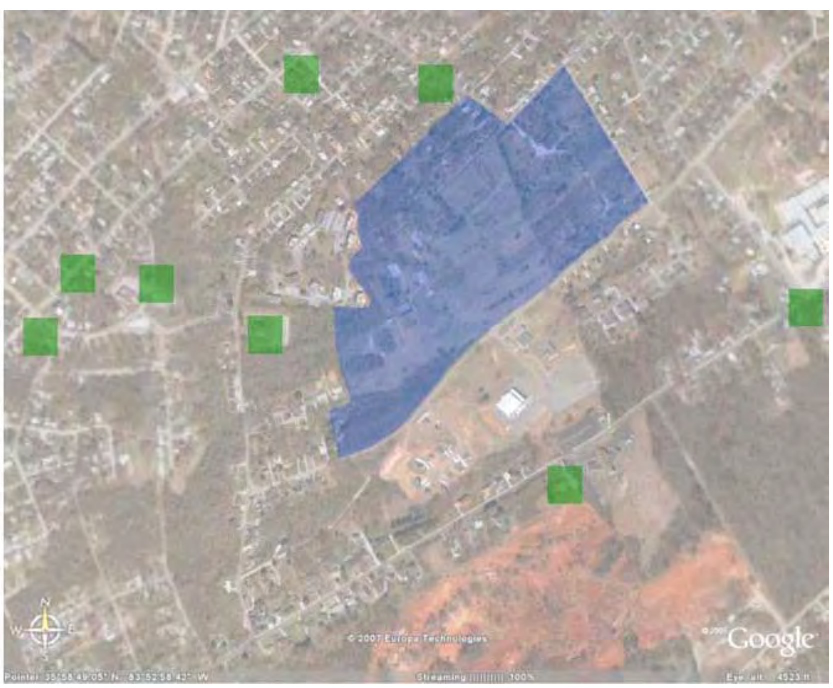

Figure 68: surrounding community churches, in green (diagram by author)

The wind patterns of the site are an integral part when designing a vineyard (figure 69). The wind, especially within such a rainy area, must be used to keep the humidity from settling on the grapes. If the water cannot be drained properly and the dew settles on the vines, the grapes become endangered to rot. The potential for freezing also grows right before spring, making it imperative that there be enough wind to keep the water from settling on the grapes within the night. Because the ratio of rain to wind within the area is not even, the implement of wind turbines becomes an important part to the health of the vineyard, and the production of the grapes.

The sun paths become imperative to understand, such that the configurations of the program and the materials chosen, reflect the desired intent of heightening awareness and altering perception. To know the angle of the sun at a chosen hour relates to how you want direct sunlight to enter the space (figure 70). To the vineyard the sun paths are less important, as the angle of the grapes to the direction of the sun are less important than the fact that the grapes just need direct sunlight in general to grow.

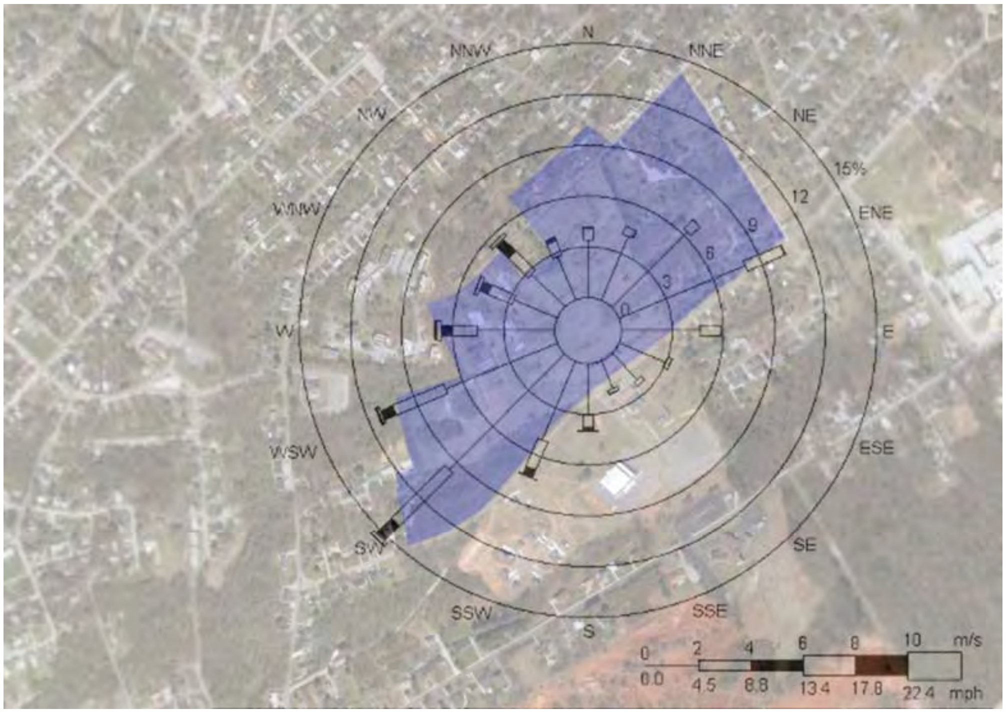

Figure 69: Wind diagram off the site, coming mainly from the southwest (diagram by author)

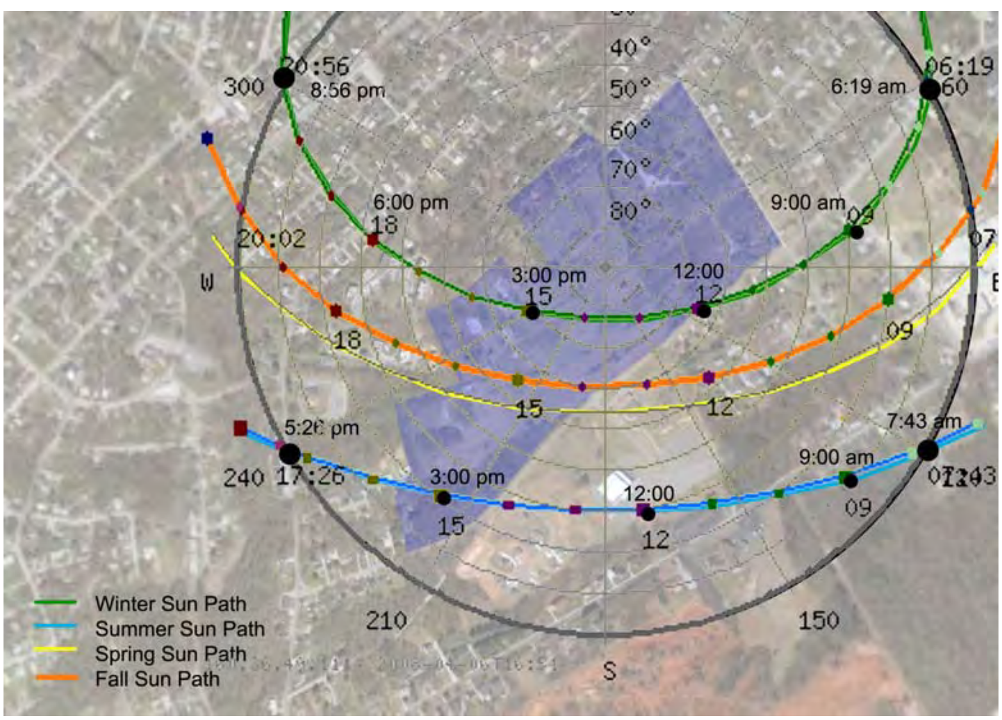

Figure 70: Sun path diagram (diagram by author)

APPENDIX B

Program Requirements

Quantitative Requirements

Keeping a vineyard on the part of the property South of Wimpole Avenue, the northern 5 acres are devoted to production and manufacture of the product. In comparison to known vineyards in Napa, this is rather small as they run from 100-200 acres on up, however, for the given site and its surroundings it should not be as sizeable. Potential in future growth can either be from expanding the vineyard to and existing 30 acres roughly 2 miles away or importing grapes in from other vineyards, either locally or from California. The potential in allowing the grapes to be imported secures work for the community. Table 1 describes the square footage required for a winery this size.

Wine Production	**Net Area (sq ft)**	**Area Difference**	**Gross Area (sq ft)**
Grape Receiving/Crushing	1500	375	1875
Fermenting and Pressing	3500	875	4375
Barrel Storage and Cellar	5000	1250	6250
Bottle Storage	2000	500	2500
Bathrooms (2)	60	15	150
Garage	3200	800	4000
Visitor Facilities			
Entry/Foyer	500	125	625
Wine Bar	500	125	625
Wine Store	500	125	625
Restaurant/Kitchen	1800	450	2250
Bathrooms (4)	60	15	300
Management			
Offices	800	200	1000
Maintenance	400	100	500
Mechanical	400	100	500
Kitchen/Lounge	560	140	700
Meeting/Conference Room	560	140	700
Locker Rooms (2)	550	137.5	1375
Apartment (2)	550	137.5	1375
Totals	22440	5610	29725
Vineyard	40 acres	40 acres	40 acres

Table 1: Square footage program requirements

Qualitative Requirements

The qualitative properties of these spaces are significantly varied as some remain strictly industrial while other spaces lend themselves to and experience.

The grape receiving/crushing space can be indoor or outdoor. It's used as a compilation space, where grapes from the surrounding vineyards are hauled in by trucks and emptied. An initial crushing occurs to diminish their size for the process of pressing and fermenting. Farmers that bring this load in may seek refuge from the suns heat while re-energizing themselves for the next run in picking.

The pressing and fermenting of the grapes is getting the juice out of the grapes such that they can remain in fermentation tanks for a few months. Once the grapes have been devoid of their juices it becomes imperative for a thorough cleaning of the barrels as bacteria is easily spread at this stage. The people within this space must be able to keep their focus and maintain efficiency.

The next step in wine making is barrel storage. After wine fills these tanks they must ferment for months sometimes a little more than a year, during this time they must be in a controlled environment with little direct sunlight. Without the control the wine cannot age correctly. This space must be ample enough such that forklifts can get in and rotate the barrels around. While little direct light enters this space, it still must be well lit to avoid accidents. It's also a space where the potential of visitors and workers will intermix. The potential for this means that an awareness for ones surroundings, and their focus is most important.

Bottle storage is not just a space where the wine bottles are kept, but where the actual bottling of the wine can take place. It offers the chance for light and a variety of materials to play off one another. Again, as this space is one where workers and visitors could interact, therefore focus and attentiveness is critical.

The entry, as in the case studies, must remain one of the focal points. It is the attention grabber, this space is what draws people into this structure, into this neighborhood, and it provides an opportunity to set up an identity for the surrounding area. It brings people in while still connecting them to the history of the site.

The wine bar and store is the space for tasting. Locals provide other an economic source of income for this neighborhood, and while the neighborhood is establishing an identity through the winery, this attraction can serve as a new identity for the city as a whole, potentially becoming a tourist attraction.

The offices are spaces that, behind the scenes, run the operations. They serve as spaces that do the books and marketing for the winery. They also should be devoid of any hierarchy, such that the farmer feels at the same level as the manager. The lounge space, for all employees, will aid in the success of 'no hierarchy'. It serves as a space where workers, farmers, and managers can go to refuel, refocus and encourage one another. Within each of these spaces lighting plays a key role in the design and understanding of sequence. It will play off a materiality choice and help the psychology of the workers in their 'roles' of their work.

APPENDIX C

Codes

Because a winery holds multiple functions, a various amount of building types are selected for code requirement study, it should be noted that all code requirements are coming from the International Building Code (Table 2). If any of its functions shall overlap the code that addresses the maximum safety capacity will be primary. The basement of these spaces is not included in the area calculations. Each addresses two different types of construction, a 2-hour, noncombustible and a mill construction. Each shows the difference between a construction that is sprinklered vs. one that is unsprinklered. The height will be limited to two stories max, as the existing structures only reach two, and the new construction should relate to the old. By limiting the stories to two the structure will relate to the surrounding family homes, such that it will not overwhelm the homes by its scale.

For any of these types of construction, because the expected occupancy load for building groups B and U, is exceeding 49, because building group S exceeds 29, and because group H exceeds 3, there must be two means of egress. A minimum door width for all three is 32", max is 48", minimum corridor width is 44", and a minimum stair width is 44" (Tables 2-4).

Occupancy Group B: Business				
2-hour fire rating		SPR		UNSPR
Max height in feet	180'	75'		
Height in stories above grade & max area in sq. ft.,	UA		UA	

3 fl				
Mill Construction		SPR		UNSPR
Max height in feet	85’	65’		
Height in stories above grade & max area in sq. ft., 3 fl	324,000	108,000		
Occupancy Group F-1: Factory, Moderate Hazard				
2-hour fire rating		SPR		UNSPR
Max height in feet	180’	75’		
Height in stories above grade & max area in sq. ft., 3 fl	UA		24,ooo	
Mill Construction		SPR		UNSPR
Max height in feet		85’		65’
Height in Stories above grade & max area in sq. ft., 3 fl		301,500		24,000
Occupancy Group H-3: High Hazard Combustibles				
2-hour fire rating		SPR		UNSPR
Max height in feet	160’	NP		
Height in stories above grade & max area in sq. ft., 3 fl	180,000		NP	
Mill Construction		SPR		UNSPR
Max height in feet		65’		NP
Height in Stories above grade & max area in sq. ft., 3 fl		76,500		NP
Occupancy Group S-1: Storage Moderate Hazard				
2-hour fire rating		SPR		UNSPR
Max height in feet	180’	160’		
Height in stories above grade & max area in sq. ft., 3 fl	432,000		24,000	
Mill Construction		SPR		UNSPR
Max height in feet		85’		65’
Height in Stories above grade & max area in sq. ft., 3 fl		229,500’		24,000’

Occupancy Group U: Utility				
2-hr fire rating		SPR		UNSPR
Max height in feet	180’	160’		
Height in stories above grade & max area in sq. ft., 3 fl	319,500’		106,500’	
Mill Construction		SPR		UNSPR
Max height in feet		85’		65’
Height in Stories above grade & max area in sq. ft., 3 fl		162,000’		54,000’

Table 2: Building Construction Codes, based on sprinklered or unsprinklered spaces

Occupant Loads	
Use	*Floor Area per Occupant*
Business Areas	100 sq ft gross
Factories, Industrial Space	100 sq ft gross
Hazardous Occupancies	200 sq ft gross
Mechanical Equipment Room	300 sq ft gross
Storage	300 sq ft gross
Warehouse	500 sq ft gross

Table 3: Occupant load table, illustrating the buildings use to the max floor area ratio per occupant

Egress System Criteria			
Use			*Maximum Travel Distance*
Occupancy Group	SPR		UNSPR
B: Business	250’		200’
F-1: Factory, Moderate Hazard	200’ 400’ (single story)		200’
H-1: Hazardous	75’		NP

S-1: Storage, Moderate Hazard	250' 400' (1-story)		200'
U: Utility	400'		300'

Table 4: Egress system criteria, illustrating the maximum travel distance per building use

APPENDIX D

Case Studies

> "Winemakers work at the mercy of the soil and the heavens, so it's no wonder wineries often demonstrate a special connection to the land." -Clifford A. Pearson

Bodegas Ysios, Laguardia, Spain (Santiago Calatrava)

Acting as both a sculpture and a building that is integrated into the landscape, this winery was contrived such that it would make a statement for the wine it produces. Keeping the interior simple and formal, Calatrava allowed the undulating of the roof structure to take center stage. Aligning the building east-west in a longitudinal fashion allows the linear motion of the process of making the wine to inform the overall shape. Attention is brought in full to the entry as the beams protrude from the building and reach out symbolizing a hierarchy to the land (a way to watch over things).

Calatrava used a palette of materials that would reflect the landscape and connect the 'sculpture' to its surrounding. The structure itself consists of undulating concrete load-bearing walls which are clad in "laminated wood of Scandinavian fir, rising up and down along the exterior walls in sine curves" (Cohn, 24). "The roof is composed of a longitudinal series of laminated wood beams supported on the staggered sinusoidal cornice of the lateral walls" (Tzonis, 322). The roof, unlike the structure, is made of aluminum. Calatrava used aluminum such that it would reflect the suns rays in a manor that became wave-like, emulating the mountainous landscape around. The south façade, consisting of cedar, resembles the earth that produces the vines. Though the material draws its coloring from the landscape, "at the same time [the overall

design] also shows how deeply [Calatrava's] process is rooted in the region, respectful to a setting that owes its identity not only to its natural environment but also to its culture as a place of cultivation" (Tzonis, 322) (figures 71-79).

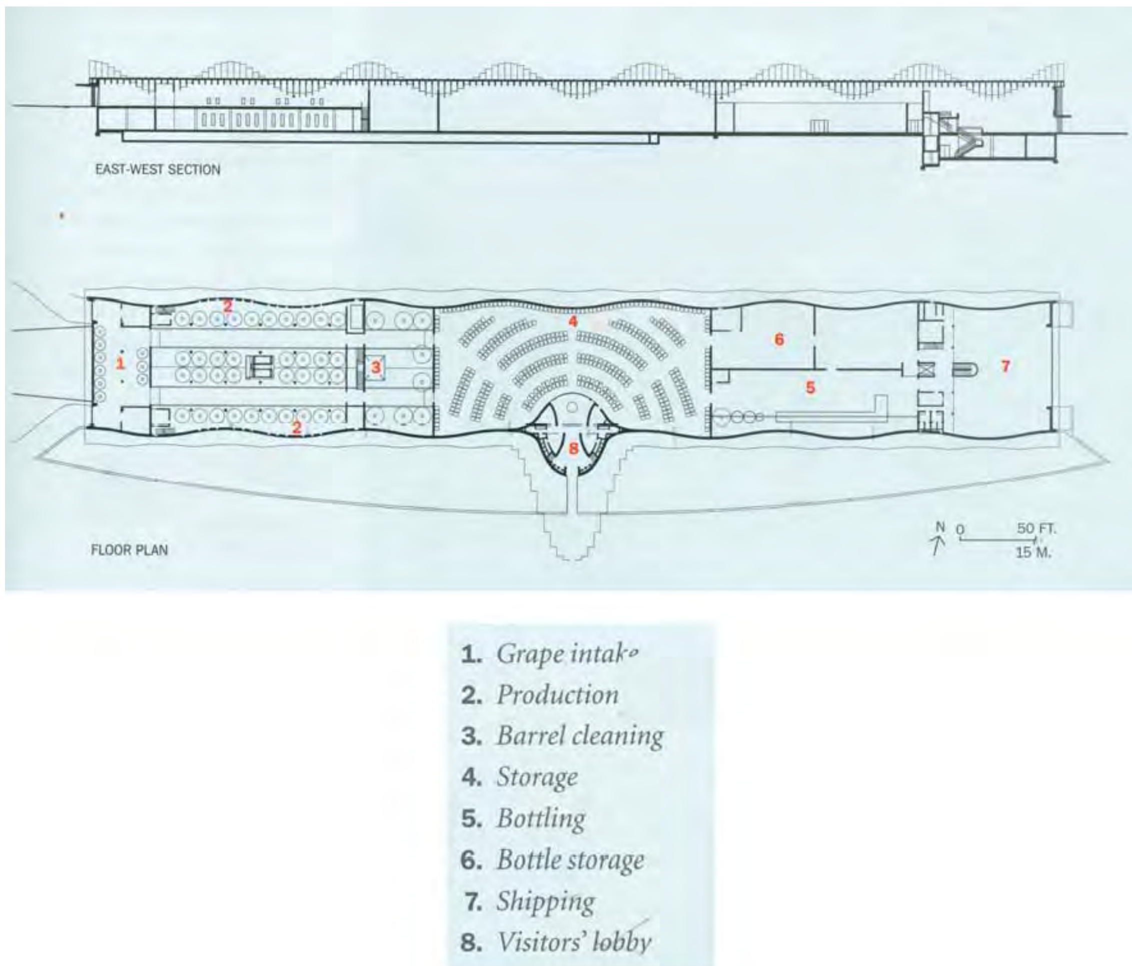

Figure 71: Plan of structure (from architectural record)

Figure 72: Arial photo with site context (by Roland Halbe, arch record)

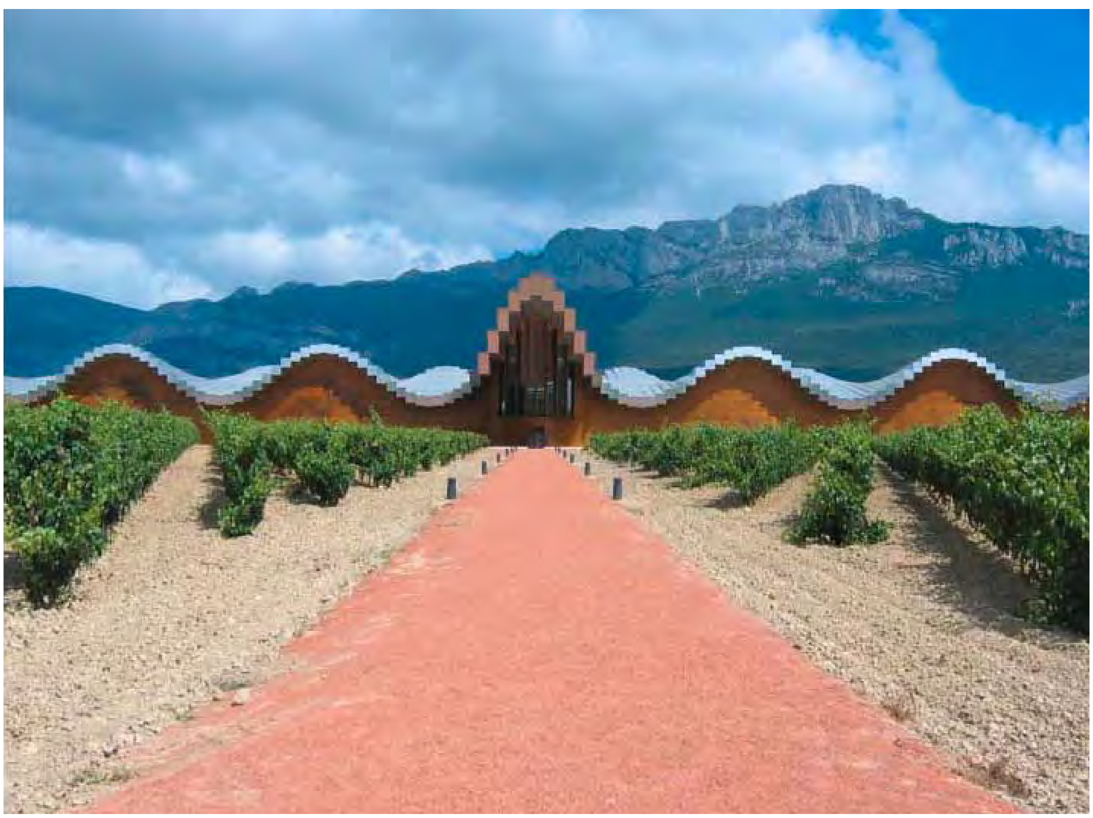

Figure 73: Curve simulation of mountain range, (by Hime www.flickr.com)

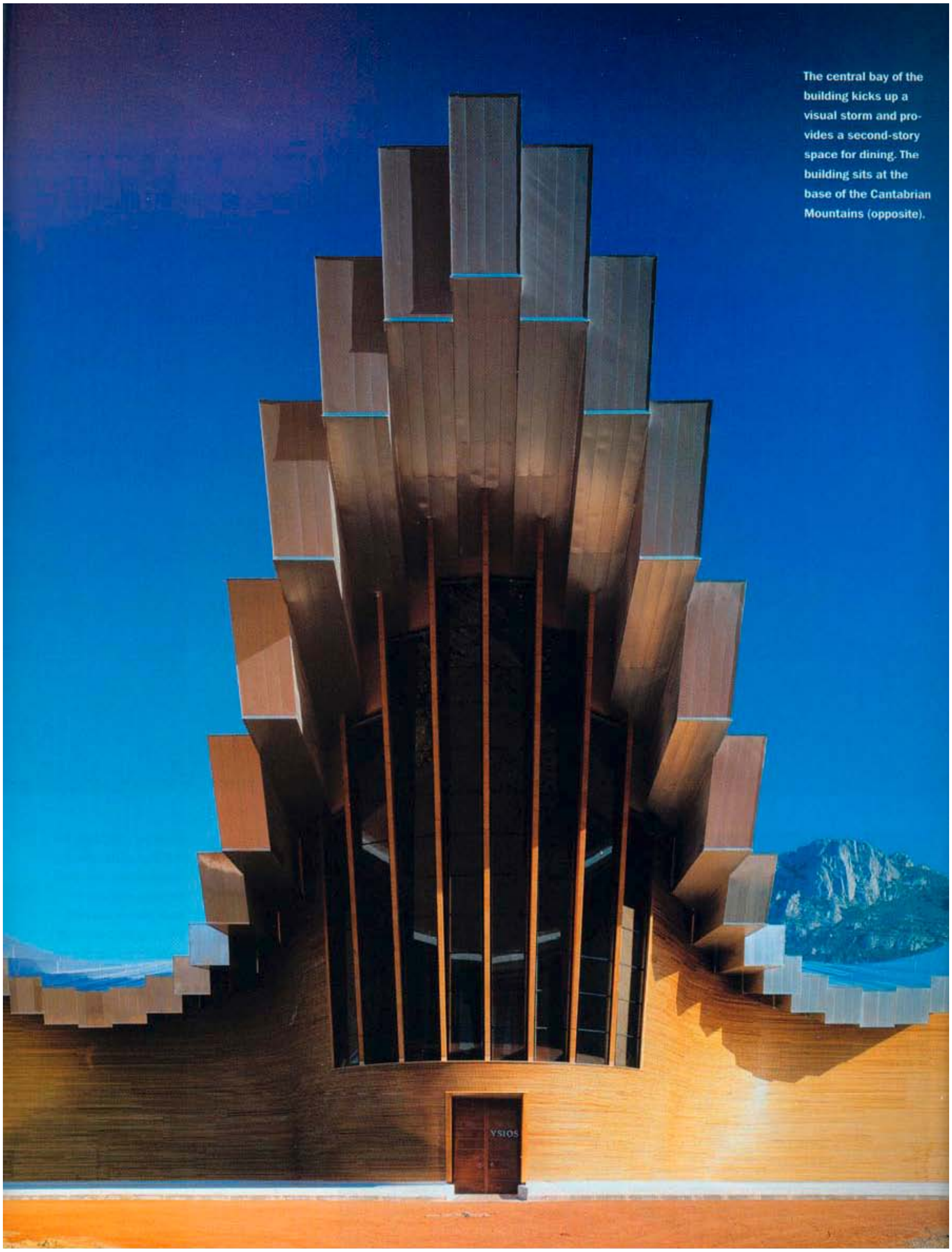

Figure 74: Entry (by Roland Halbe, architectural record)

Figure 75: Exterior of Entry (by Roland Halbe, Arch Record)

Figure 76: Interior second floor of entry (by Roland Halbe, architectural record)

Figure 77: Interior Storage (by Roland Halbe, arch record)

Figure 78: Fermentation Room (by Roland Halbe, arch record)

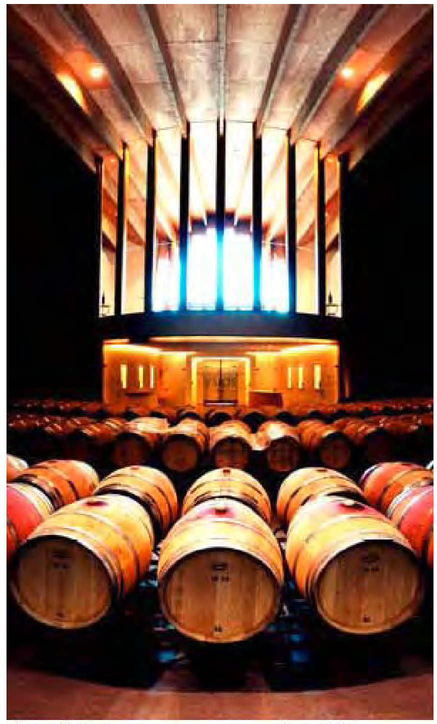

Figure 79: Interior of storage looking out entry in distance (by Steven2358, www.flickr.com)

Bodegas Julian Chivite, Arinzano Spain, (Jose Rafael Moneo)

Rafael Moneo focused on the context of the Bodegas Julian Chivete, site for his design. It was the "wonderful mix of history, architecture and the will to continue a family tradition in winemaking that extended back generations" (Stanwick, 34). A development of the 740 acres incorporates the existing "medieval tower, 18th century mansion, and a Neoclassical chapel" (Cohn, arch record May 2003) by wrapping the new buildings around these structures. The three different structures follow the procession in the making of the wine, informing the sequence of space in a transition from the industrial private zones to the public spaces.

The entry serves as the monumental passage into the realm of the

winery, where the materiality connects the individual to the buildings, and the buildings to each other and the buildings to the landscape. Materiality was chosen to resemble the passage of time, to co-exist with those structures that are already on site. The restored mansions red stucco compliments the stone chapel. The existing mansion was renovated into a hotel, to better serve its visitors. Each color and material was chosen such that it would age gracefully and match the existing structures.

The procession from the entry starts with the fermentation tanks, placing the visitor in the heart of the industrial process. Light from a clerestory leads you through the space to the next, a storage facility for the aging wine. After which you end in the tasting area, where more appreciation is gained as the whole process has already been viewed. Views throughout this entire procession remain closed until the end, where one can view the entire property, reflecting back on it and the history of the site (figures 80-86).

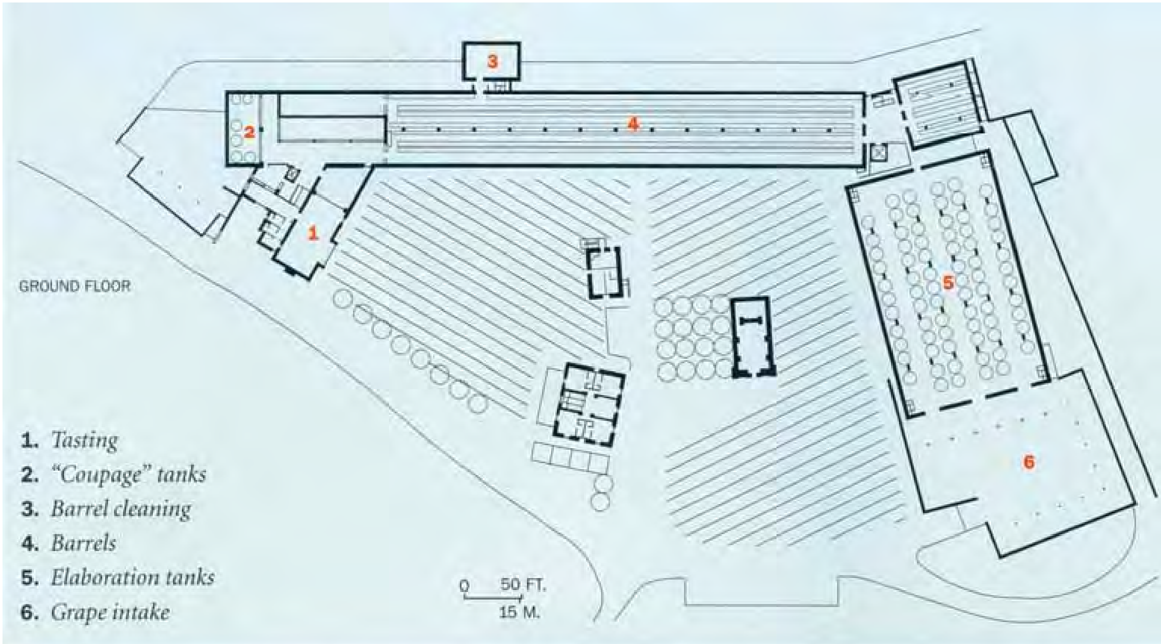

Figure 80: Plan of structure (by Roland Halbe, Arch record)

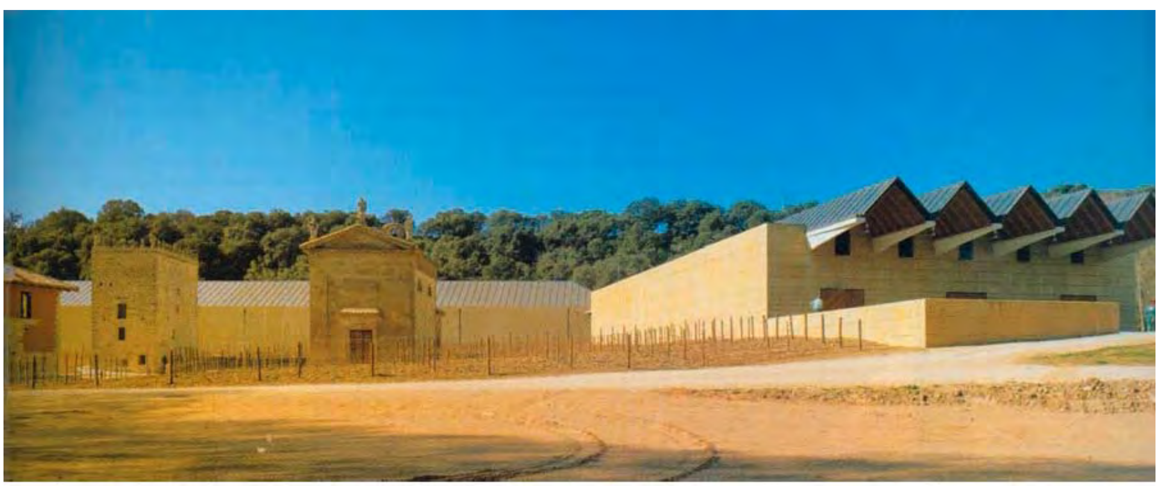

Figure 81: Exterior Elevation with vineyards in the front (by Roland Halbe, arch record)

Figure 82: Entry Frame (by Roland Halbe, arch record)

Figure 83: Entry door and canopy (by Roland Halbe, arch record)

Figure 84: Storage space (by Roland Halbe, arch record)

Figure 85: Light penetration through slanted clerestory (by Roland Halbe, arch record)

Figure 86: skylight illumination (by Roland Halbe, arch record)

Mission Hill Estate Winery, Westbank British Columbia (Olson Sundberg Kundig Allen Architects)

Above Lake Okanagan the Mission Hill Estate Winery aspires to reach the tourism levels that Napa Valley has achieved. Olson Sundberg Kundig Allen Architects created "a winery [that] is a strange mix of hospitality and a petrochemical plant" (Olson, 248) in attempt to create something that couldn't be forgotten, a delicate process of mixing the logistics of the wine making, with its intrigued visitors.

Existing structures on the site were limited to an existing warehouse leaving the architect to have full reign on a new design. It began by setting up proportions of space that would mimic the wineries surroundings. The largest structure imitates the size of the coastal mountain range, whereas the smallest structure exists in proportion to Mission Hill gardens. The procession through the space correlates to the sizes going from a small, but dominant entry to the largest of the processing spaces. The entry serves as an anticipation point, where the massive concrete arches, held together by a keystone, which holds the families crest, frames the site beyond.

The structures that surround the courtyard within act as a shield, protecting its inhabitants from both the sun and the wind. A bell tower serves as a focal point connecting people to their surroundings, literally by allowing people the ability to climb up and view everything below and metaphorically through its significance to a church or small town. Buried underground the cellar becomes the interior focal point, with its deep rich color palette of its materials contrasting with the skylight or "oculus" which provides a small highlight or connection to the world above. This space is derived from its essential purpose.

The material choice overall is again referencing an idea of time, where an 'aged' look takes precedent over the modern feel of the structure. Materials that age quickly were not chosen, but a finish was applied in a purely aesthetic manner providing the look of something that is old. The concretes exterior colors were chosen such that the base of the structure would blend in with the soil of which it sits. OSKA Architects state that "the design of the Mission Hill Family Estate is, in essence, the design of an experience" (http://www.oskaarchitects.com/files/mission.html) (figures 87-97).

Figure 87: View of complex with dominant bell tower (www.flickr.com)

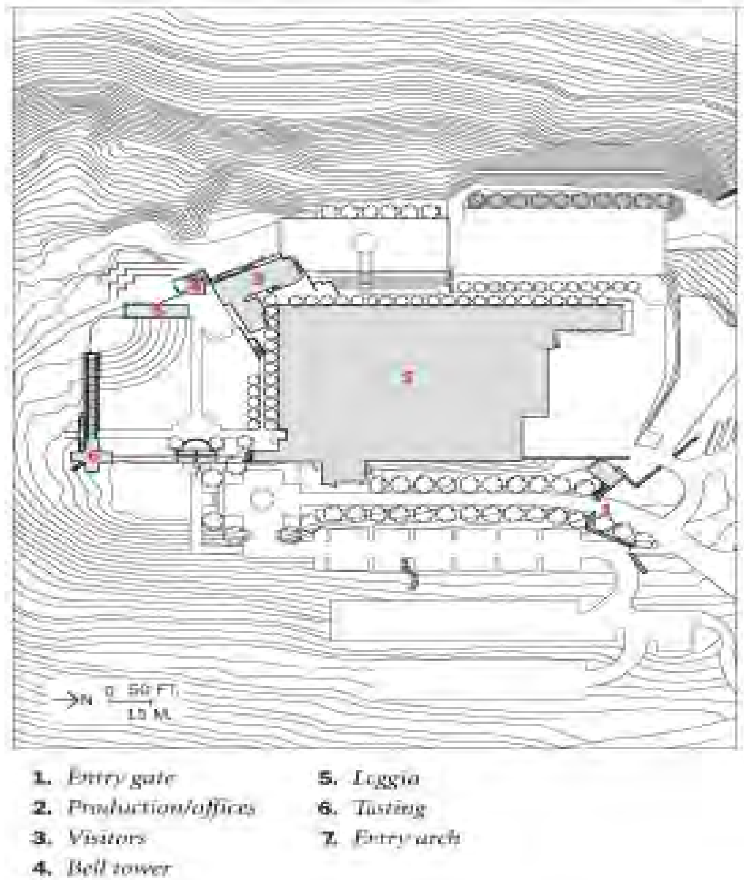

Figure 88: Site Plan (arch record)

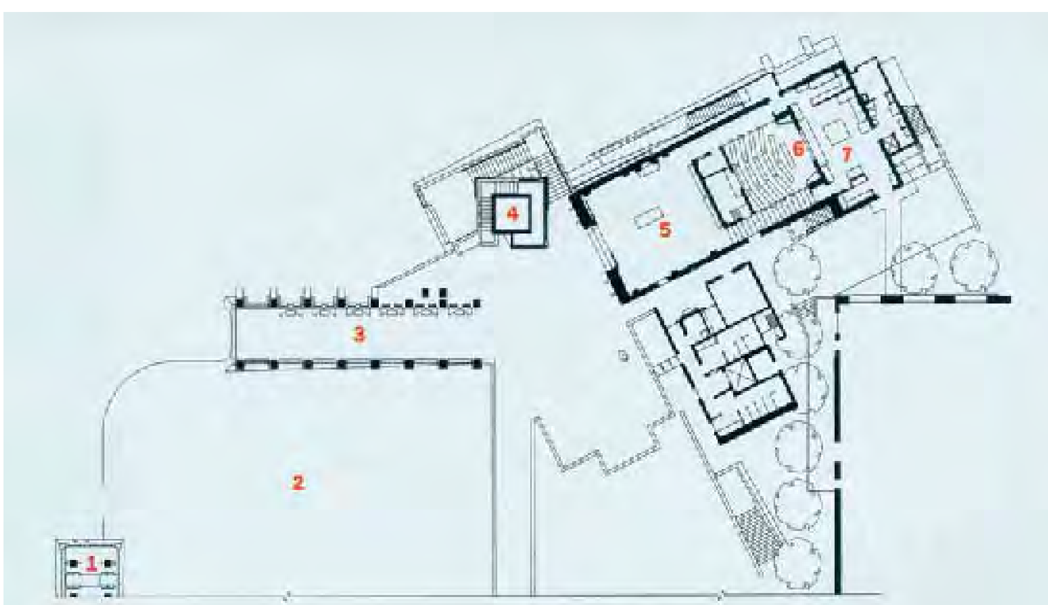

Figure 89: Top/Ground floor plan (arch record)

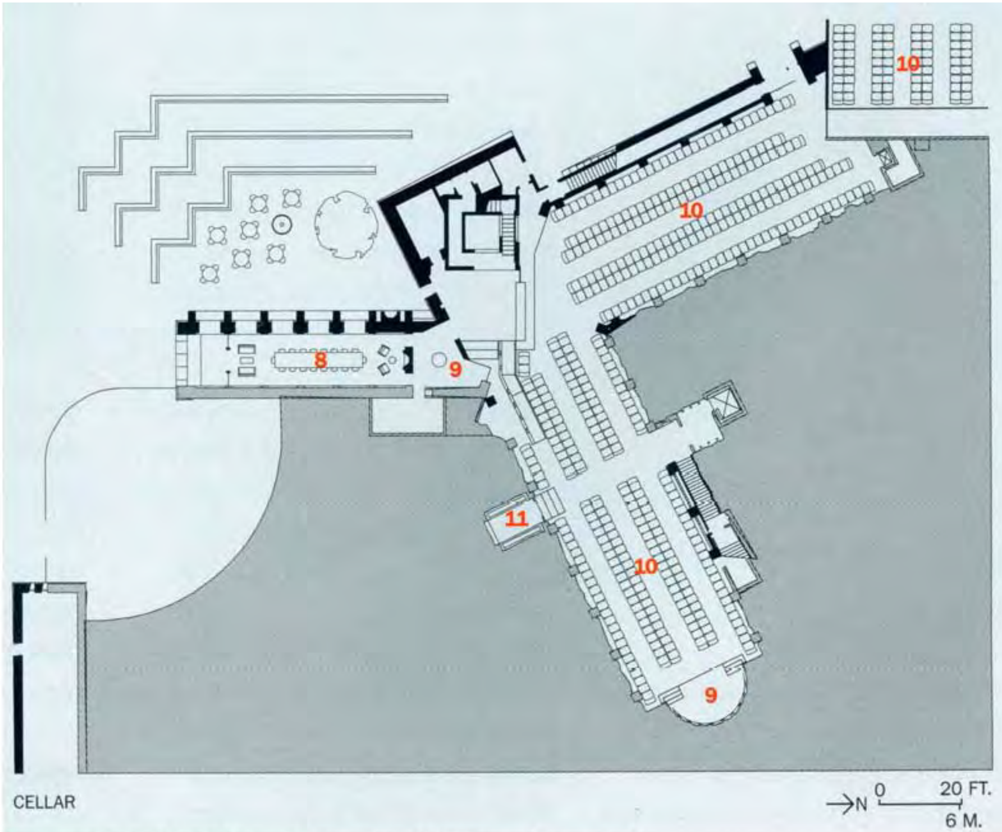

Figure 90: Cellar Floor Plan (architectural record)

Figure 91: Entry Arch (www.flickr.com)

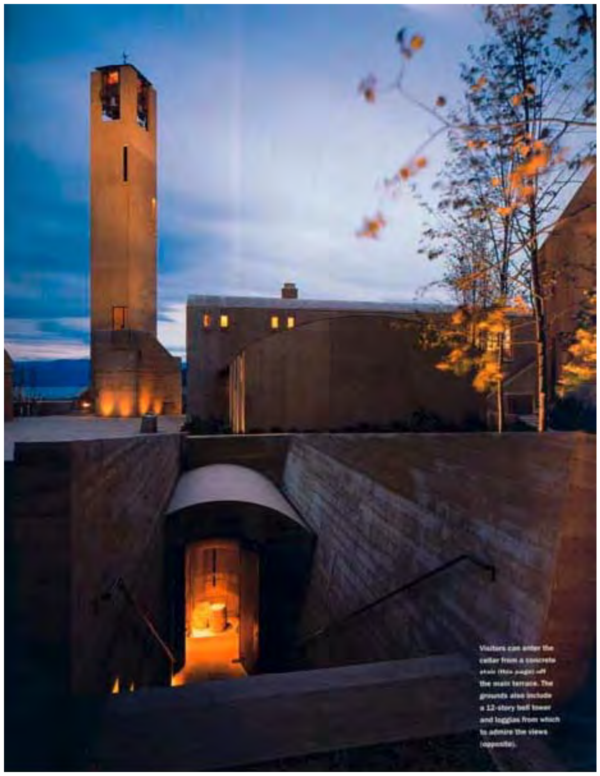

Figure 92: Entry to Cellar (by Roland Halbe, arch record)

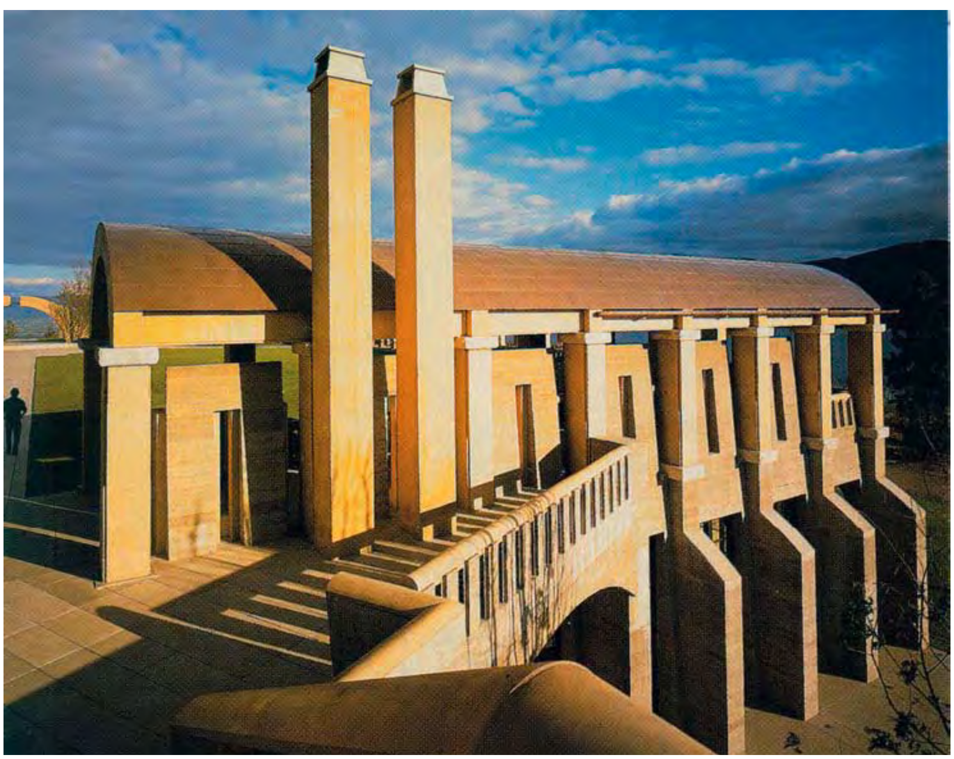

Figure 93: Backside (by Roland Halbe, arch record)

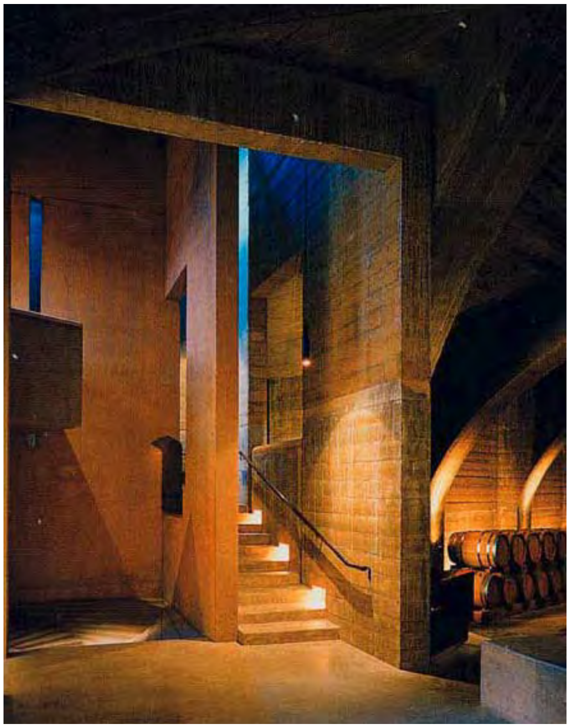

Figure 94: Exit/Entry stair from the cellar (by Roland Halbe)

Figure 95: Cellar with single oculus (source unknown)

Figure 96: Cellar electric lighting effect (by Roland Halbe, arch record)

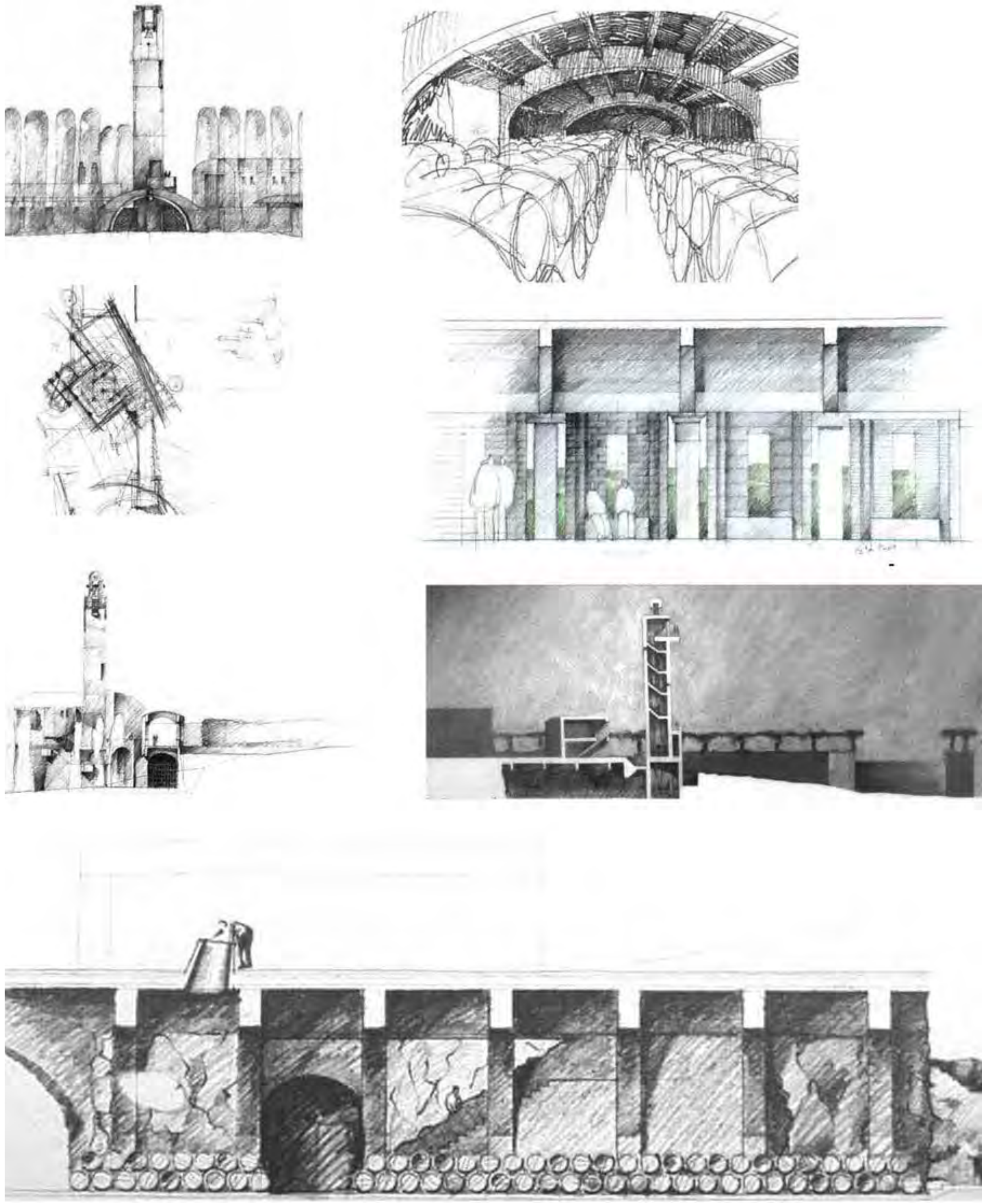

Figure 97: Initial sketches (done by architect http://www.oskaarchitects.com/files/mission.html)

Bodegas Perez Cruz, Paine Chile, (Jose Cruz Ovalle, Arquitecto)

A 1,300 acre farm is rooted to the Bodega Perez Cruz family, consisting of a 370 acre vineyard the winery sits at the base of the Andes Mountains. The climate, Mediterranean, is temperate, explaining why “people have been making wines in the Maipo Valley since the 19th century” (Pearson, 252).

Unlike its counterparts, this winery does not lend itself to its visitors, its curved façade is an “organic expression of the activities performed inside and the character of the natural setting outside” (Pearson, 252). The spaces within exist for production and the programmatic functions that support it, not for the tourists. Jose Cruz Ovalle, the architect, placed a “simple wooden shed [which] springs from the soil through a sinuous network of arched ribs that organically express the activities within, while at the same time referring to Chile’s rural periphery” (Stanwick, 154). Clifford Pearson, in his article *Bodegas Perez Cruz: Jose Cruz gives architectural expression to a family’s relationship with the land and its commitment to winemaking,* quotes Jose Cruz as stating, “I envisioned the building embodying the wine industry’s relationship to both tradition and innovation” (252). Programmatically the functions were to remain separate, connected only by the roof structure. Where the form, as seen in section, imitates two wine barrels set side by side.

Its material, laminated wood, emphasizes the architects stress on perforations that allow for a variety of natural lighting conditions. The most theatrical of this effect “occurs in the trapezoid void spaces left over between the vaults, as a mezzanine walkway snakes their length…” (Stanwick, 157). This allows the form of the structure to be appreciated from all sides, both from the

interior and the exterior. Sean Stanwick and Loraine Fowlow equate Cruz's use of light to a "near religious experience" (Stanwick, 157). It's the color of the wood, along with its finish and the finish of the concrete that aids in the formation of light. Because of the barrel form, and the placement of the clerestory, light cascades down the interior. The entire form, and the placement of its seemingly floating roof, continues this dramatic effect on the exterior (figures 98-105).

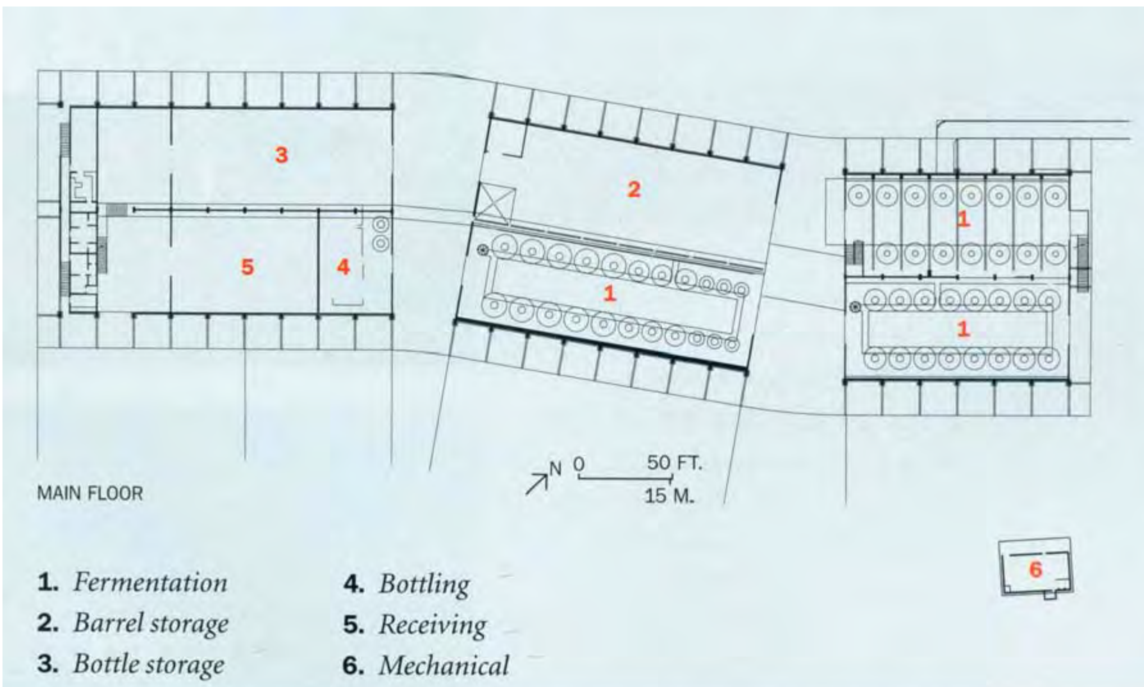

Figure 98: Main Floor Plan (architect record)

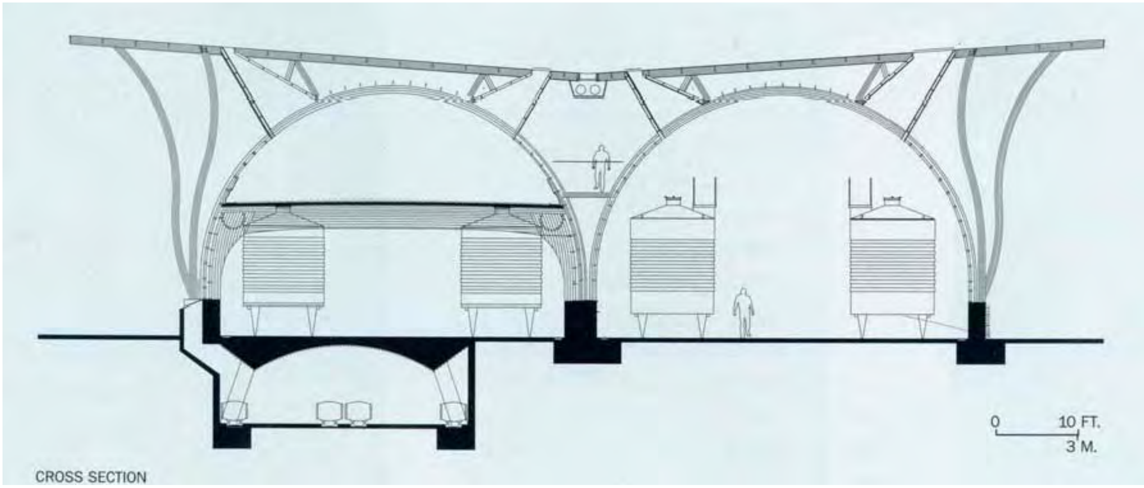

Figure 99: Cross Section (by arch record)

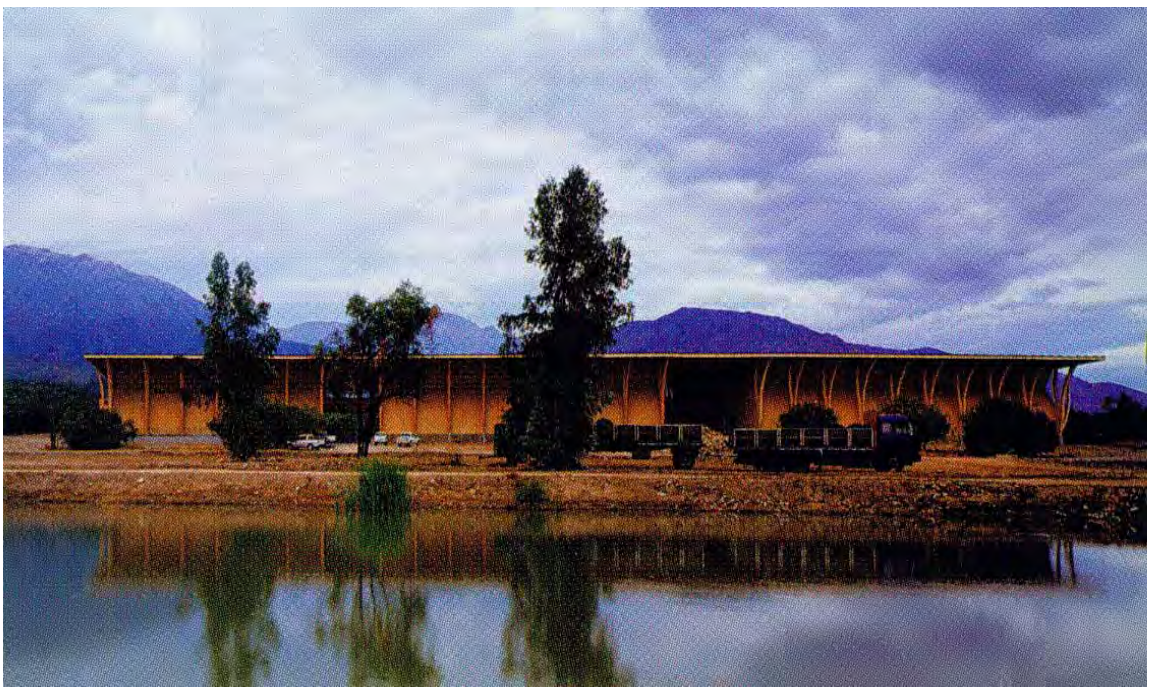

Figure 100: Exterior Elevation Photo (by Roland Halbe, arch record)

Figure 101: View at Walkthrough (by Roland Halbe, arch record)

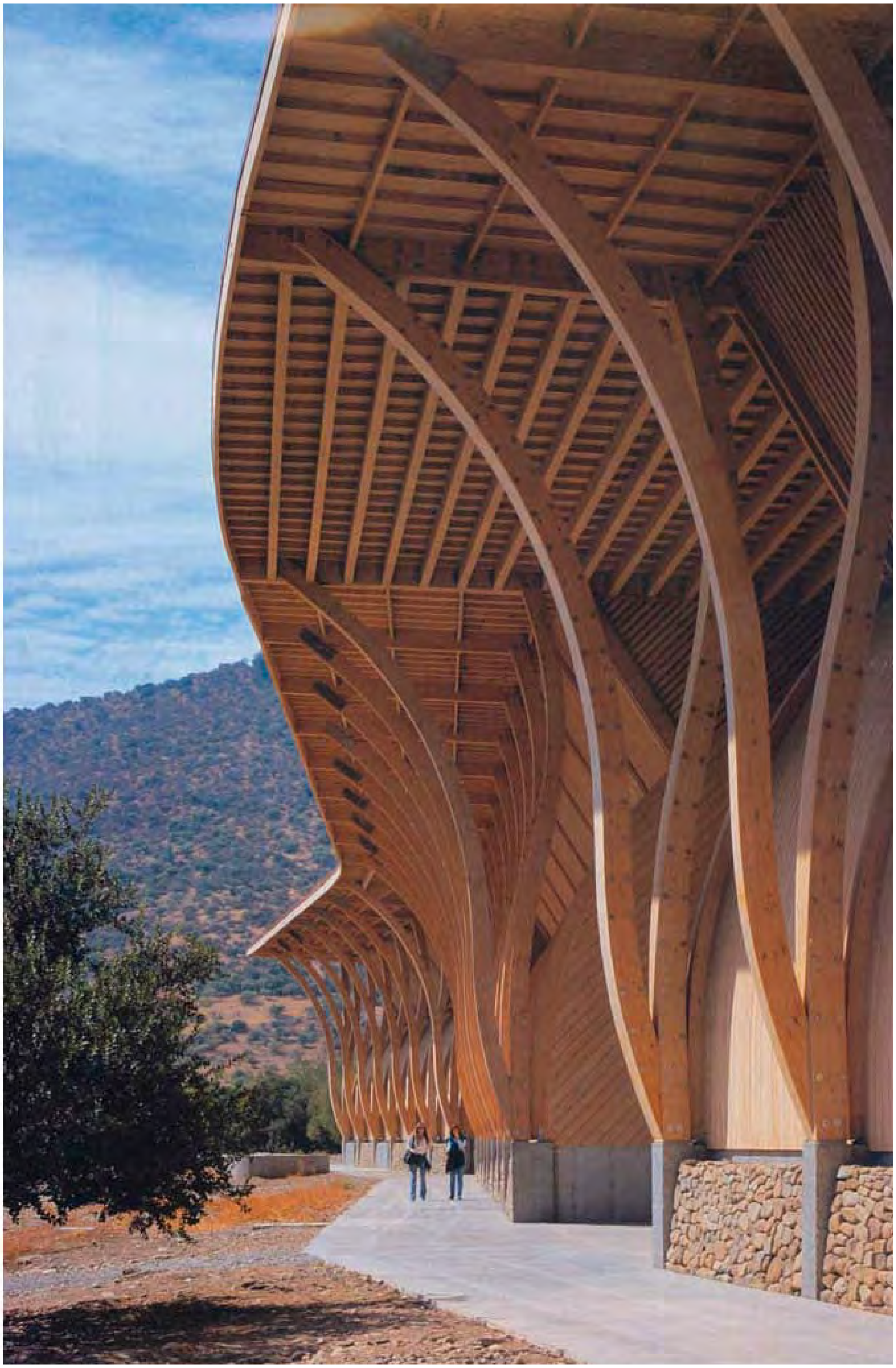

Figure 102: View along exterior wall (by Roland Halbe, arch record)

Figure 103: View of Clerestory light (by Roland Halbe, arch record)

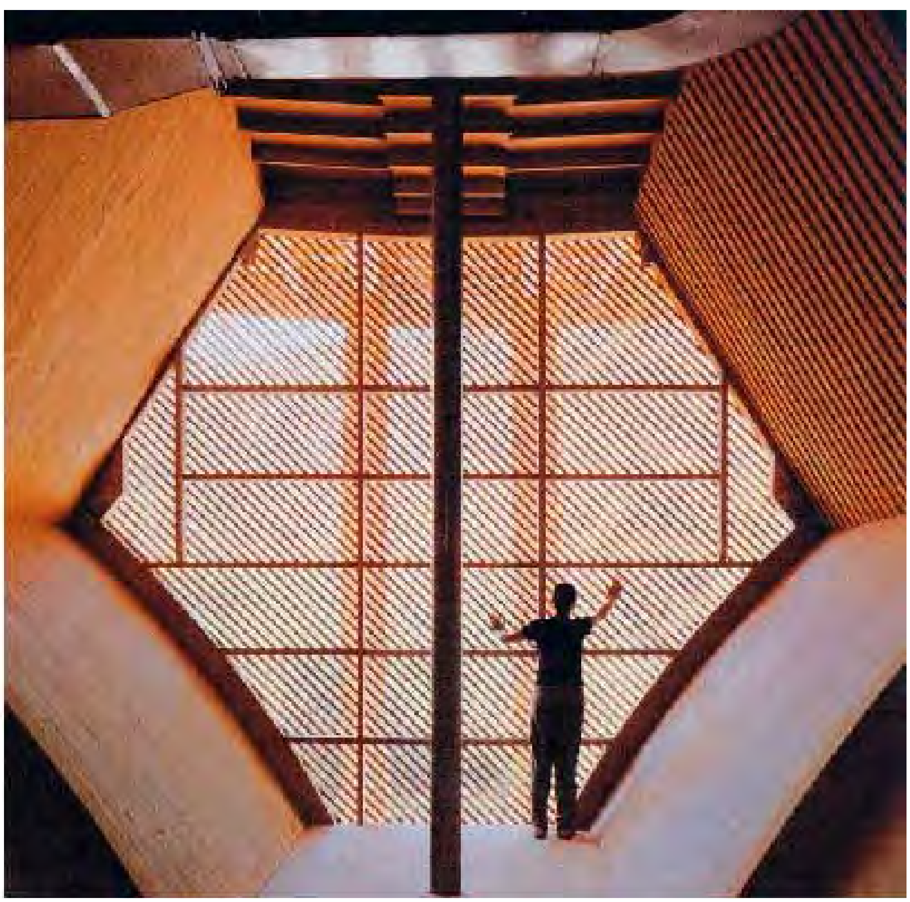

Figure 104: View of Upper corridor nook (by Roland Halbe, arch record)

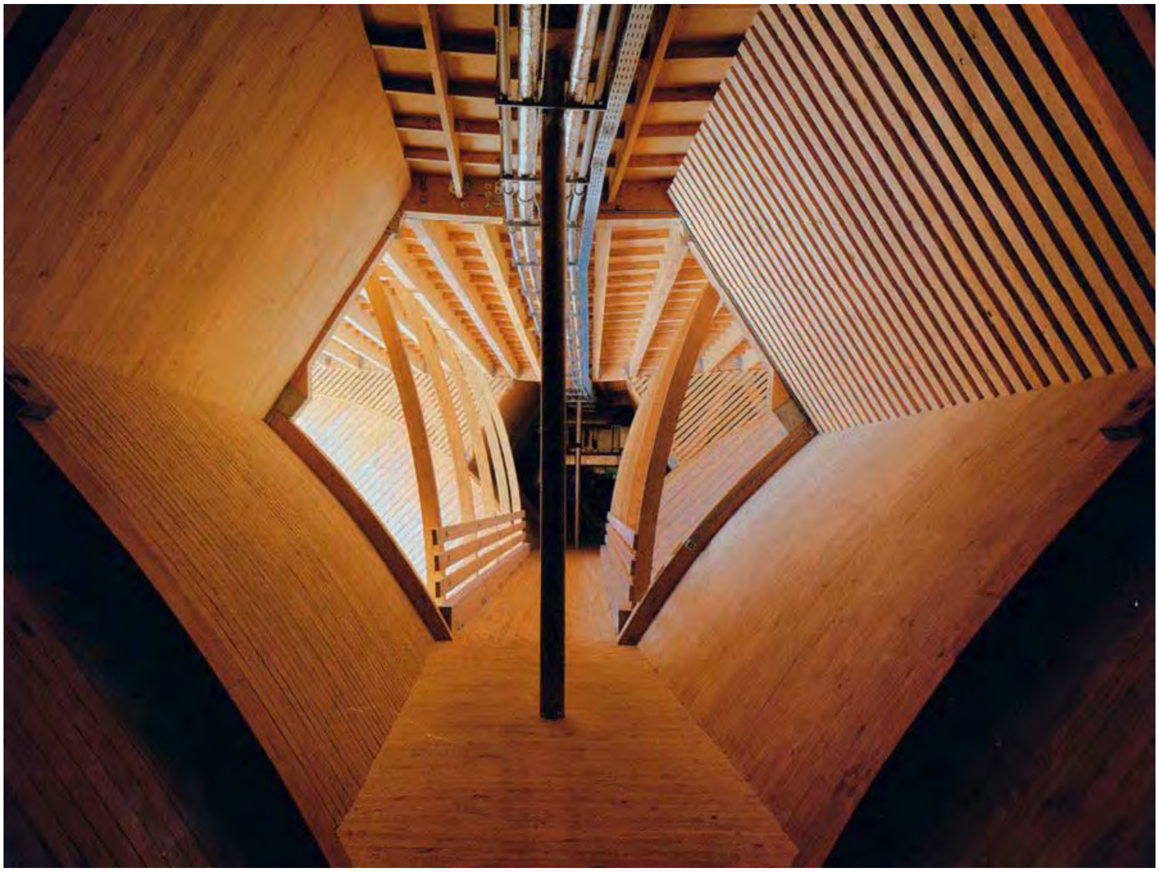

Figure 105: Upper corridor between “barrels” (by Roland Halbe, arch record)

Seattle Public Library

Monica Soto Ouchi in her article *“Patrons flock to Central Library grand opening”* in the Seattle Times stated that the new Seattle Public Library is a space designed for the everyday user. This space, became a community hang-out and brings Seattlites together. Or, as OMA describes it, an “information store, where all media – new and old – are presented under a regime of new equalities.” Providing a space where technology drives the ambition to learn, to grow. With this technology comes the ability to disregard the book all together, if nothing else, reading a book online certainly contains different qualities than in an open space, curled up on a sofa.

An urban glass box, this architecture allows for as much transformation as

the varying climate of Seattle morphs the atmosphere of the spaces within. But not just for the interior user, pedestrians, traffic, and surrounding buildings are allowed views in and reflections off. Not just a hub for books, it also holds an administrative center, book-sorting center, and civic center with an auditorium and meeting rooms, while still conceiving for room to grow. The form itself is based off five “platforms,” as OMA calls them, becoming a “programmatic cluster that is architecturally defines and equipped for optimal performance, with different sizes, densities, and opacities” (www.oma.eu). The voids that form become secondary spaces, or spaces for “work, interaction, and play.” This building, OMA, believes to be “sensitive (the slopes will admit unusual quantities of daylight where desirable), contextual (each side can react differently to specific urban conditions) and iconic.”

Materiality was thought about and purposefully minimized; an interior wall serves as an exterior frame, flooring is designed to show time, show wear, allowing structure and insulation to illustrate and articulate the walls, color is brought in to emphasize particular moments throughout the circulation. As one of the diagrams illustrates below, these spaces were pulled out in the design phase, designated for more attention on the interior. Sunlight is thought about in the extreme, in an urban dense space, this “glass box” lets as much in as possible (figures 106-114).

Figure 106: Entry interior with light and shadow (www.spl.org)

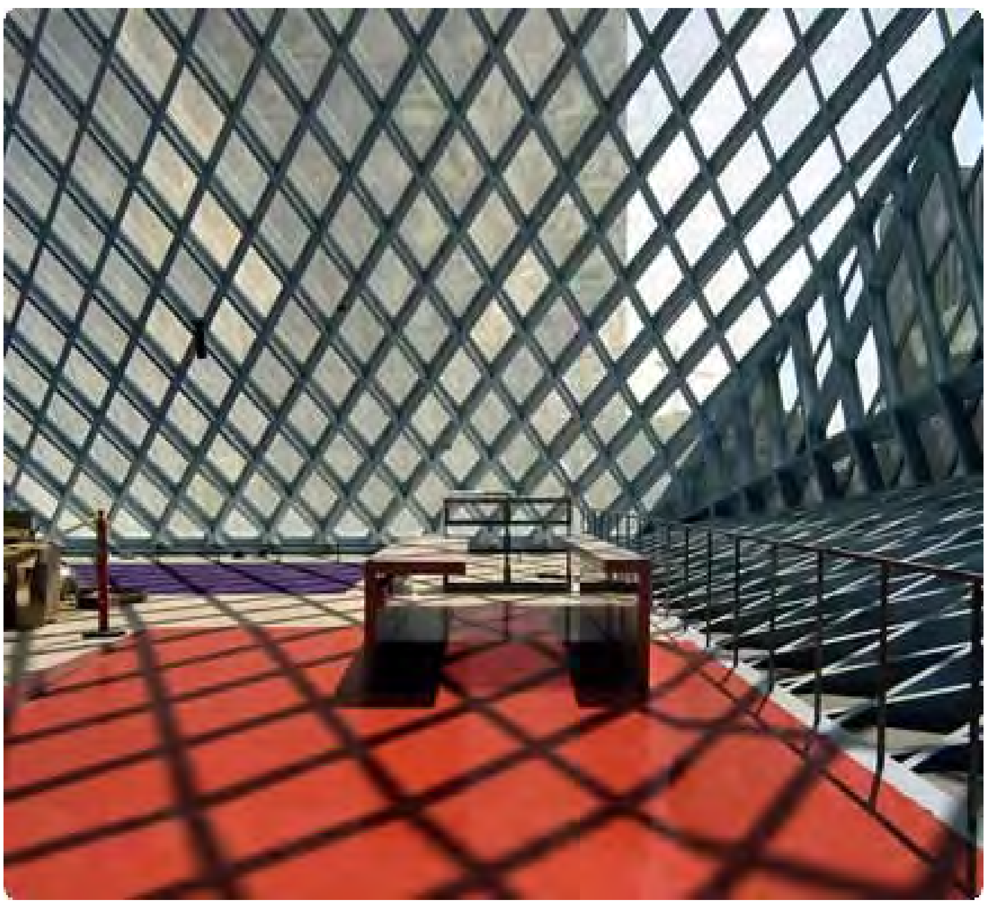

Figure 107: Structural shadow (www.spl.org)

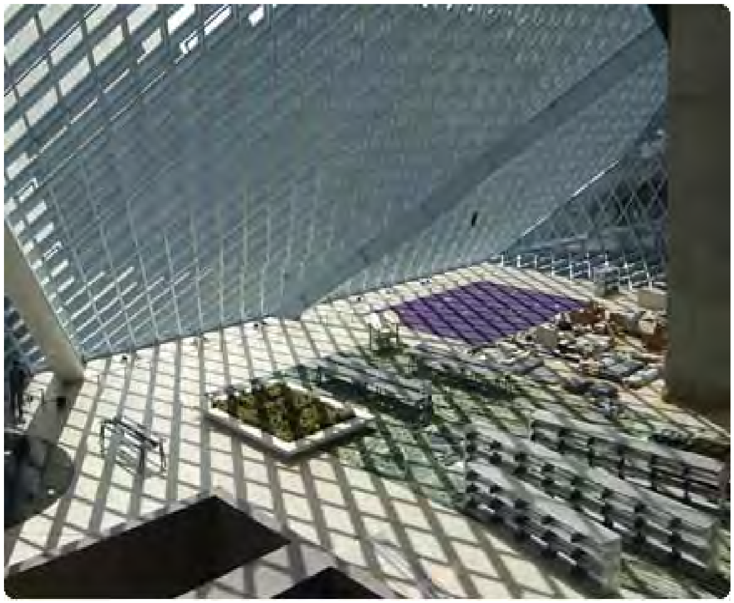

Figure 108: Structural shadow (www.spl.org)

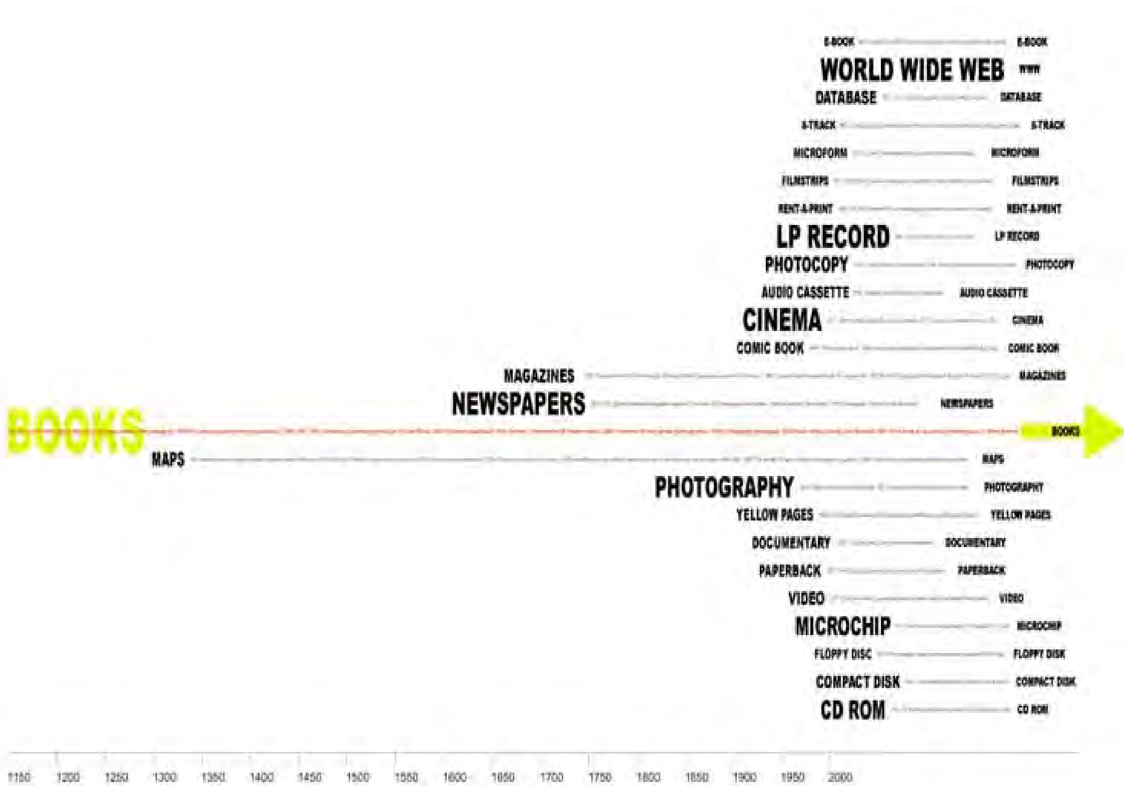

Figure 109: the diagram illustrates, in timeline form, the importance of books from the 1100s to today and the other media that have taken their place (diagram by OMA)

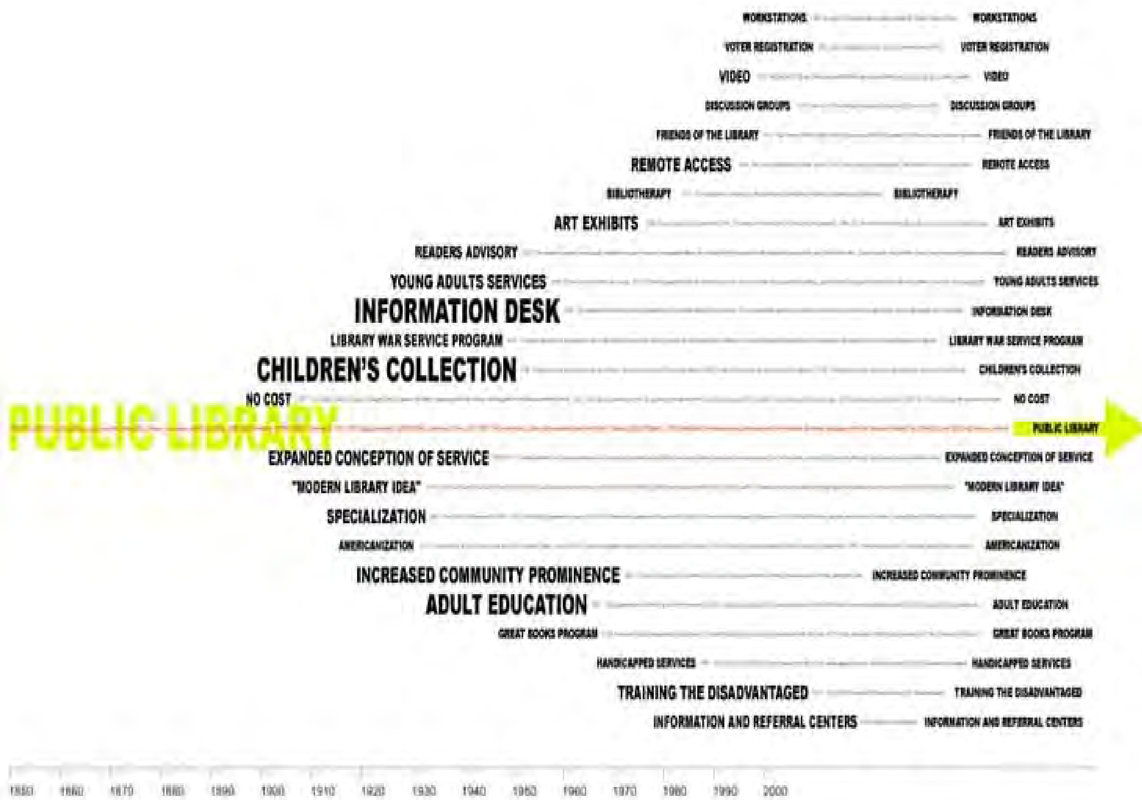

Figure 110: shows in timeline form, the importance of a libraries social role within a community. It is this community that does a balancing act, focusing on a few to address head on, while others may take a back seat (diagram by OMA)

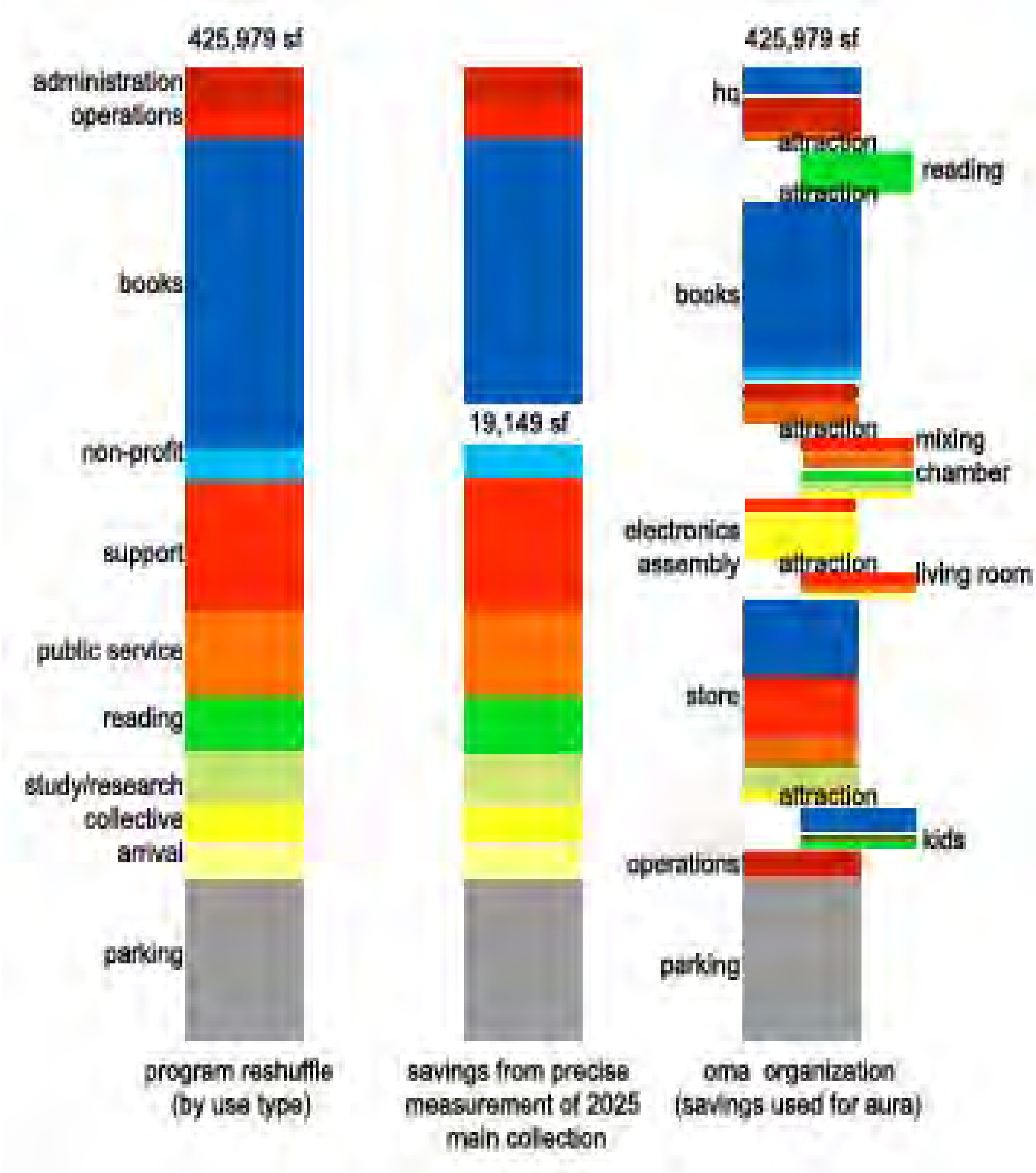

Figure 111: diagram of the programmatic functions of this library, where pieces were segregated out that held more meaning through the interaction, thus the interior of these spaces were held more hierarchical. The left over pieces became the “blocks” of the building, creating its form (by OMA)

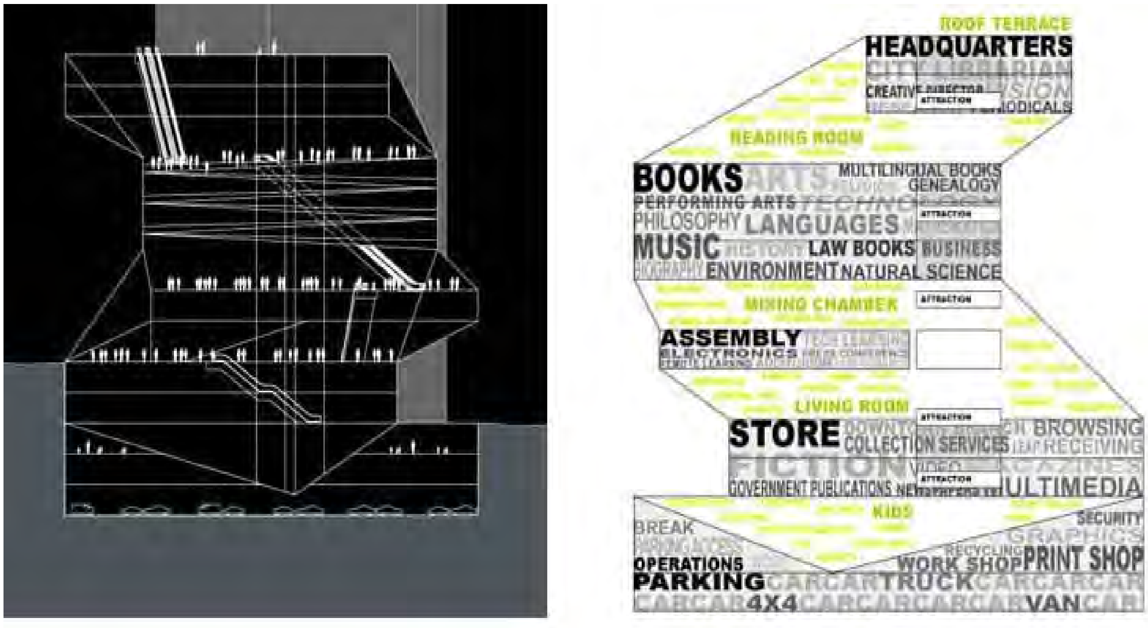

Figure 112: Illustration of conceptual form through is function by sloping facades which allocate more daylighting throughout, unlike its high-rise neighbors (by OMA)

Figure 113: Each of these “blocks” of space correlates to its site, based on views from above, and the importance of light on its base levels (by OMA)

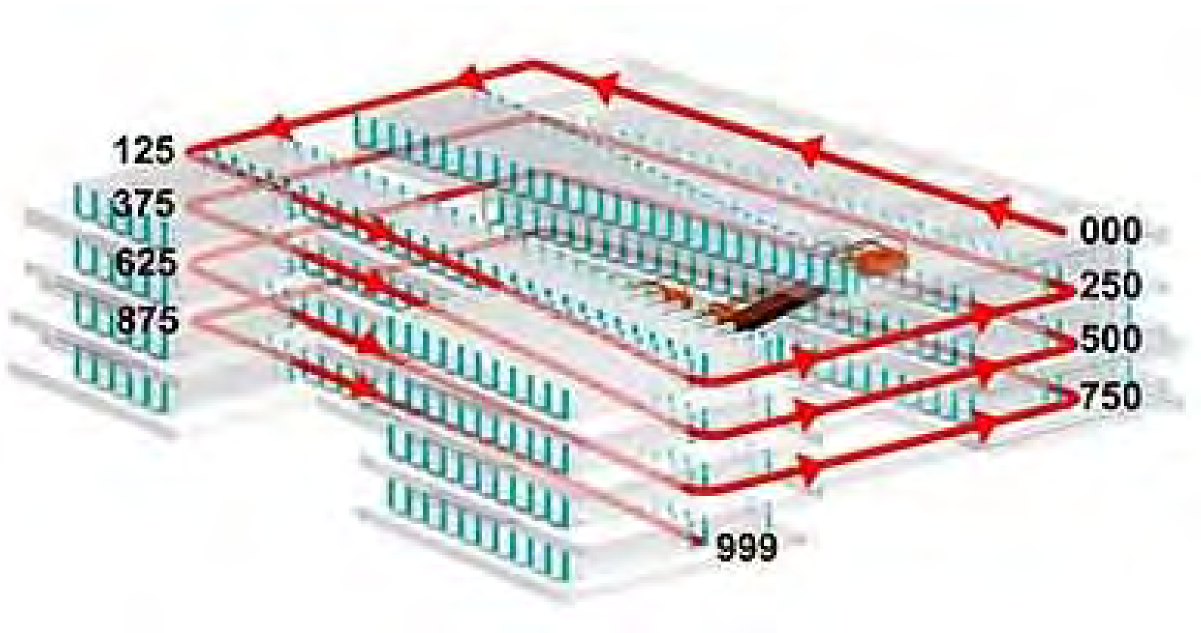

Figure 114: The libraries circulation pattern, and its ability to encourage walking, a continuous path is formed around the stacks and marked throughout (floors, maps, walls) for easy way finding (by OMA)

VITA

Michelle Barton was born in Missoula, Montana on June 1, 1984. She grew up in Helena, Montana and went to Kessler Elementary School and C.R. Anderson Middle School. She graduated from Capital High School in 2002. From there, she went to the University of Idaho where she received her Bachelors of Science in Architecture in 2006 and her Masters of Architecture from the University of Tennessee in 2008. After graduating she will be working toward getting her license.